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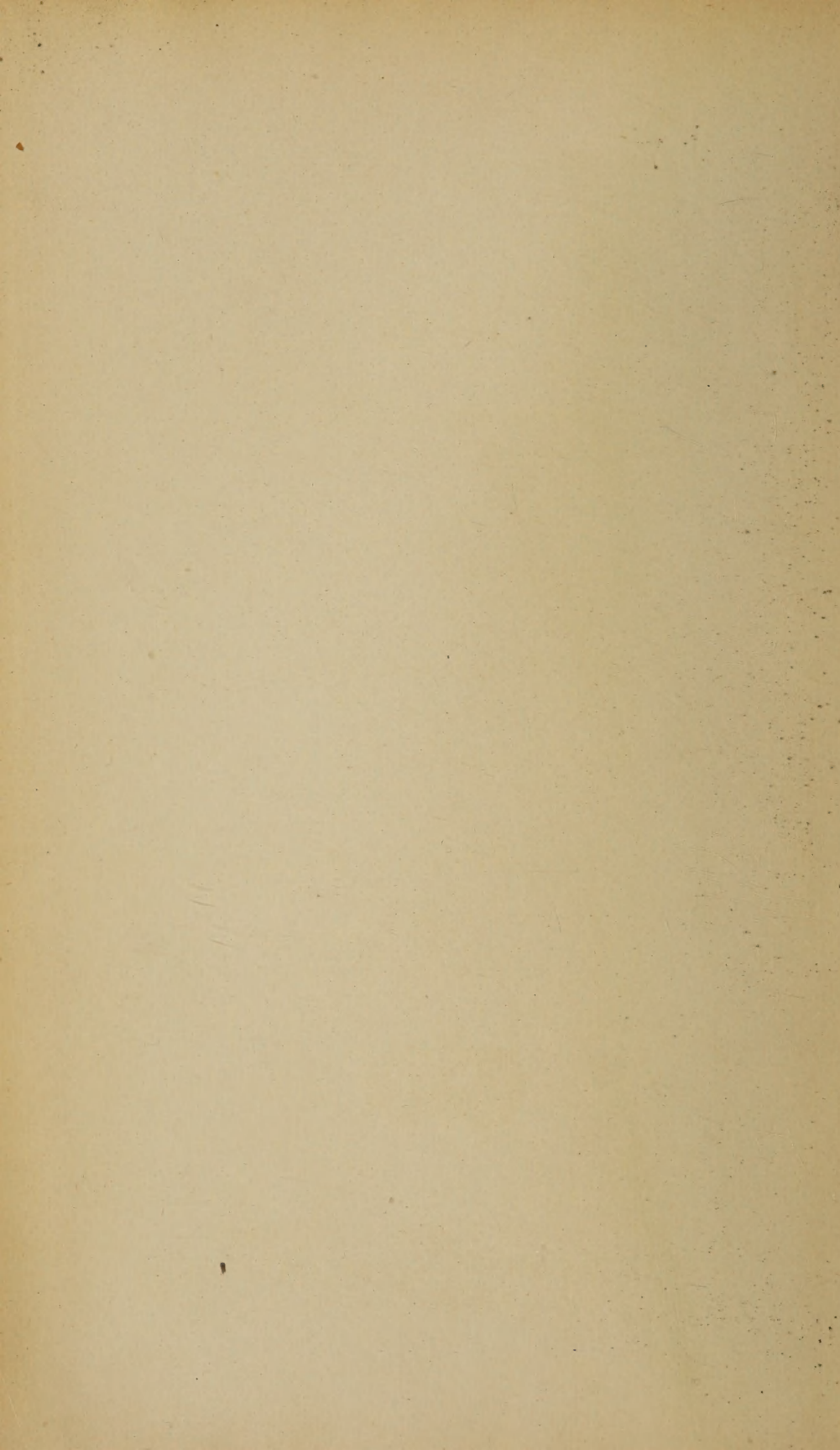












ANNUAL

OF THE

# UNIVERSAL MEDICAL SCIENCES

A YEARLY REPORT OF THE PROGRESS OF THE GENERAL  
SANITARY SCIENCES THROUGHOUT THE WORLD.

EDITED BY

CHARLES E. SAJOUS, M.D.,

AND

SEVENTY ASSOCIATE EDITORS,

ASSISTED BY

OVER TWO HUNDRED CORRESPONDING EDITORS, COLLABORATORS,  
AND CORRESPONDENTS.

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VOLUME I.



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## PREFACE.

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IT is with a feeling of great satisfaction that the editor has the honor of presenting the fifth series of the *ANNUAL* to the medical profession. Thanks to the devotion of the members of the associate staff and to their willingness to comply with all measures calculated to increase the practical usefulness of the work, the general character of the articles indicates that a proper conception of its true purpose has finally been reached, and that uniformity—so difficult of attainment in publications of great magnitude, representing the labor of so many writers—has become an element worthy of recognition. Considering that the gradual evolution of the *ANNUAL* to the state of perfection to which, it is hoped, it will some day be brought, involves not only the intricacies usually accompanying editorial work, but many others occasioned by the immensity of the undertaking, the rapidity with which the yearly work of preparation must of necessity be performed, and the small army of co-operators engaged in it, such a result, so early in the career of the publication, augurs well for its future.

For the medical press in general the deepest gratitude is entertained. During the five trying years that may be considered as the period of inception of the work, the expressions of kind feeling, generous support, and disinterested praise have afforded incalculable encouragement, most valued and leaned upon during moments of temporary despondency, when the whole edifice seemed to be surrounded by elements that might cause its un-

timely downfall. Through the influence of this support the incentive to continue the policy adopted from the start—a kindly feeling for all—was but strengthened. The few rubs received were carefully studied, with a view to discover and remedy, if possible, any just cause for criticisms; even the half-dozen periodical sheets—the property of two American publishing firms—which persist in ignoring the *ANNUAL*, refusing to exchange with it (one firm even prohibiting quotations from the columns of its publications) have suffered no retaliation. They may continue in perfect peace; time may make them understand the true purpose of the *ANNUAL*, and obliterate from their minds the idea that it can in any way be considered as an antagonist. The 98 per cent. of medical periodicals which have honored it with their support have understood that it does more than any publication extant for the perpetuation of the journals and of the work presented in them. It carries their names and the good work they contain to all parts of the earth, and, between covers calculated to ornament a library, preserves their identity and their choice contributions for future generations. How many complete series of that once great journal, “*London Times and Gazette*,” could now be found in the libraries of medical men? Had the *ANNUAL* then lived, most of its talented contributors, now dead to contemporary medicine, would still live through their work; whereas, now, the difficulty of obtaining access to their writings relegates them to the domains of obscurity. No sheet is too unimportant to merit oversight at the hands of the editorial staff. Each periodical, however small, is the representative of a community, of a section, or of a class, and it would certainly be rash to conclude that not a man among them is capable of contributing occasionally a point of value worthy of notice. The possibility of the *ANNUAL* supplanting weekly, monthly, or even quarterly journals—at first feared by

a couple of contemporaries—has been demonstrated by time to be ill-founded. “The Ledger Almanac,” which gives an outline of the year’s current events in the city of Philadelphia, could no more pretend to obliterate that city’s dailies than could the ANNUAL any of its colleagues, even were this its wish. The aims of each are different. The one class supplies current events; the other records those worth perpetuating in a form readily available. The true medical man needs his weekly as much as the business man needs his daily.

The ANNUAL by no means pretends to have reached the point of excellence that it is hoped it will some day attain. A conscientious attempt to make it advance as rapidly as possible has been made, but many are the shortcomings still to be conquered, and the developments still to be evolved. A prolonged sojourn in Europe, contemplated by the editor, will, it is hoped, open many new channels calculated to widen the scope of the work and increase the sphere of its usefulness.

If no “improvements” are announced this year, it is because the fountain of useful suggestions has apparently become exhausted. Justice has been done to all those offering the best evidence of advantage to the readers. Many others could not be entertained without risk of sacrificing material of much greater importance than the proposed improvement.

But few changes have been made in the associate staff. Dr. Joseph O’Dwyer, of New York, has accepted the department of “Intubation,” and Dr. Simon Baruch, also of New York, that of “Climatology and Balneology,” to which has been added a section on “Hydrotherapy.” The papers of these gentlemen will be found replete with valuable information.

Dr. C. Sumner Witherstine, owing to excessive occupation, could not continue the preparation of the index, much to the

regret of all. It was this year undertaken by Dr. D. Braden Kyle and Miss N. I. McCarthy, First Assistant in the Central Department, the former editing the column on "Therapeutics."

Greater accuracy has been observed in making the reductions in weights and measures, which fact will explain what may appear at first glance as curious variations. Tinctures, spirits, compound spirits of ether, sweet spirits of nitre, and fixed and volatile oils have been estimated as lighter than water; syrups, glycerin, and chloroform, as heavier than water,—all in their proper proportion.

To the publishers, The F. A. Davis Company, the editor expresses his thanks for the progressive spirit shown in facilitating his work; and to Mr. H. B. Van Horn, the efficient manager of the typographical department, whose executive ability has so largely contributed to make the work of the editor lighter, and to secure the prompt appearance of the ANNUAL.

Thanks are also due to Messrs. Burk and McFetridge, as in former years, for their conscientious and painstaking lithographic work.

THE EDITOR.

PHILADELPHIA,  
April 25, 1892.



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# DISEASES OF THE LUNGS AND PLEURA.

By JAMES T. WHITTAKER, M.D.,

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## PNEUMONIA.

THE blood in broncho-pneumonia has been the subject of some interesting observations by Kikodse, <sup>6 13</sup><sub>Mar. 21; Oct.</sub> who found that the white blood-corpuscles increased in number to as much as double or treble the normal amount. In fatal or very severe cases no increase was found. As a rule, however, the augmentation begins even before the physical signs of pneumonia are detected, and persists from that time on to the crisis with little variation, to suddenly fall immediately after the crisis. The cause of the increase appears to be the return into the circulation of the corpuscles which have passed out into the alveolar spaces; hence, probably, the preponderance of overmature corpuscles, which ceases after the crisis. The increase, when observed, is found to be in the fully-mature and overmature corpuscles, rather than in the newly-formed corpuscles.

The microbes of pneumonia have been studied by Banti, <sup>50</sup><sub>B. 9, No. 5</sub> who found the diplococcus lanceolatus present in every one of 47 cases of fibrinous pneumonia. The most notable feature of his researches is the almost invariable presence of the diplococcus lanceolatus in lobar pneumonia, not only in the exudation in the lung and pleura, but often in the blood. Variations in the intensity of the disease seemed to depend on differences in the virulence of the microbes, complications, as a rule, being excited by the same agency. Suppurations produced by the pneumococcus of Fraenkel, during experiments by Nannotti, <sup>90</sup><sub>May</sub> led to the following complications: an abscess in the left submaxillary region, one in the mastoid region, with partial necrosis of the mastoid apophysis, a peridental abscess, and a perineal abscess in a subject probably

tubercular. Buccal infection in broncho-pneumonia has been studied by Méry and Bouilloche.<sup>118</sup> Bacterial examination of the saliva in 48 consecutive cases of measles in children caused the detection of the pneumococcus lanceolatus of Fraenkel in 14 cases and the streptococcus pyogenes in 11 cases, either one of these microbes being present in 52 per cent. of the cases. Observations of the saliva of 20 children suffering from chronic diseases, or acute disease other than respiratory, showed that one or the other of these microbes was present in 15 per cent. only. This demonstrates that secondary bronchial and pulmonary affections of measles occur only when the saliva contains the pneumococcus or the streptococcus, with but few exceptions. They observe as a corollary that it is desirable to give careful attention to the mouth during measles, and to as much as possible render it aseptic. Systemic infection in secondary pneumonia has been investigated by Haushalter,<sup>184</sup> who inoculated nutrient gelatin with blood obtained from the finger. In the 3 cases experimented upon cultivations of the staphylococcus pyogenes aureus were obtained. He considered this microbe probably secondary to the pneumonia, and found that cultivations of the staphylococcus injected into the trachea of rabbits were capable of producing lobular pneumonia. He suggests that this systemic infection may account for the occasional occurrence in the secondary pneumonias of whooping-cough, measles, and other acute infectious diseases; of tumefaction of the spleen, acute nephritis, endocarditis, and adynamia.

A case in which the diplococcus of pneumonia occurred in the milk of a woman affected with pneumonia was reported by Bozzolo.<sup>854</sup> The patient, who was nursing a child 5 months old, was attacked by a pneumonia crouposa sinistra, which later on extended to the right lung, and was followed by endocarditis and ended in lysis. Cultures of milk pressed from the breasts on the fifth day of the disease gave rich developments of pneumococci. Immunity against pneumonia pneumococcus, and the best manner in which to insure it, was the subject of researches by G. and F. Klemperer.<sup>4</sup> Their experiments, which were confined to rabbits, revealed that every nutrient medium in which the pneumococcus has been cultivated will, if inoculated, render an animal immune against pneumonic septicæmia, even after the cocci have been removed by filtration. The power of producing immunity is

more speedily acquired if the infected nutrient medium be exposed to a temperature of  $41^{\circ}$  and  $42^{\circ}$  C. ( $105.8^{\circ}$  and  $107.6^{\circ}$  F.) for two or three days, or of  $60^{\circ}$  C. ( $140^{\circ}$  F.) for an hour or two. An interval of from three to fourteen days was necessary between the inoculation and the production of the immunity. Hence, the injection could not cure or act as a prophylactic if given simultaneously with the outbreak of the disease. Serum taken from the blood of animals enjoying immunity, when introduced into the circulation, was able, however, to cure pneumonic septicæmia. The serum was injected twenty-four hours after infection, while the animal had a temperature of between  $105^{\circ}$  and  $106.5^{\circ}$  F. ( $40.6^{\circ}$  and  $41.4^{\circ}$  C.). Eight cubic centimetres (2 drachms) were injected, with the result that the temperature gradually sank during the next twenty-four hours. In 12 successive cases a successful result was obtained. These experiments have been confirmed by Foà<sup>3</sup><sub>Oct.28</sub> and Carbone.<sup>997</sup><sub>Jan.5</sub>

The prevention of pneumonia has been carefully studied by Foà<sup>505</sup><sub>Jan.18</sub> <sup>25</sup><sub>Feb.</sub> who has made further researches concerning the immunity obtained against pneumonia by injecting an attenuated culture of the diplococcus of pneumonia. Foà has obtained by means of sulphate of ammonia, a precipitate from the culture in broth. This being repeatedly filtered, a substance is obtained which, being introduced for three or four days into the blood of rabbits, so modifies the constitution of the animal that it cannot be infected with the diplococcus. He also made an extract from the muscle and viscera of an injected rabbit dead from the induced pneumonia. The extract was filtered and precipitated with sulphate of ammonia, and then dialyzed and dried. This substance introduced into the veins of a rabbit rendered it immune against infection of the diplococcus, while the same preparation, obtained from a healthy rabbit in the same manner, did not prove preventive.

Emmerich<sup>324</sup><sub>V.12</sub> <sup>53</sup><sub>Sept.5</sub> claims that an outbreak of pneumonia may be prevented by protective injections, while the disease, if once established, may be cured by the same means. The immunity or cure is to be obtained by injections of blood or juice from the tissues of immunized animals. Herzog,<sup>53</sup><sub>Sept.5</sub> who has studied the experiments of Emmerich and observed his results, considers them very favorable, and they seem to him to warrant the belief that

the juice of the immunized rabbits as prepared by Emmerich will not only confer immunity but also obtain cures. Numerous experiments on rabbits are mentioned by the last writer.

A case is described by Collins,<sup>497</sup> <sup>17</sup> which he is inclined to consider as one of infective pneumonia, due to extension of an erysipelas of the pharynx down the bronchial tract to the parenchyma. Gangrene as a consequence of pneumonia is reported by Syers.<sup>6</sup> <sup>18</sup> The case occurred in a boy, and resulted in recovery. A very puzzling case of pneumonia with an excessive amount of dry pleurisy is reported by Holt.<sup>19</sup> <sup>July 25</sup> It is claimed by Berthier<sup>92</sup> <sup>2</sup> that there is a form of pneumonia which gives the signs of pleural effusion, and has been termed *pneumonie massive*. A case of purulent arthritis following pneumonia is reported by Picqué and Veillon.<sup>25</sup> <sup>May</sup> It occurred on the fourth day of the pneumonia, and was situated in the right knee. The pus was examined under the microscope, submitted to various methods of culture, and inoculated into animals. It proved to be a true pneumonic arthritis. Acute transitory œdema of the lung just at the commencement of the pneumonic crisis is reported by Kahane.<sup>319</sup> <sup>No. 10</sup> Phlegmasia alba dolens in 2 cases of pneumonia is reported by Mya.<sup>900</sup> <sup>May 31</sup> Autopsy in 1 of them showed a large thrombus in the femoral vein, below the crural arch. The thrombus was pus-like, and adhered firmly to the wall. It consisted of numerous red globules, leucocytes, and fibrin. Bacteriological examination showed capsulated diplococci. An injection made in a rabbit with an emulsion of this thrombus caused death by septicæmia. Cultures of this animal gave colonies of diplococci.

Acute pneumonia followed by chronic pulmonary tuberculosis is reported by Hanot.<sup>360</sup> <sup>Aug.</sup> The author states that, before the application of bacteriological research to clinical investigation, this case would have been considered as one of acute pneumonic phthisis. The causative pneumonia had passed into a subacute condition, ending in chronic tuberculosis. Examination of the sputum showed the pneumonia to be due to the pneumococcus, and the tuberculous evolution took place secondarily in the pulmonary tissue already modified by the previous infection. The physical signs of the case never cleared up entirely, and about three weeks later tubercle bacilli were found in the sputum, although none had been found on the fourth day of the disease. Two weeks

later the physical signs were much the same; the patient's condition had improved, but there were still many tubercle bacilli in the expectoration.

*Prognosis.*—The prognosis of pneumonia is ably discussed by Drummond, <sup>6</sup><sub>Mar. 25</sub> who thinks it would be a great gain if we could recognize approaching dangerous crises, and thus diminish the number of so-called sudden and unexpected deaths. In the weak, elderly, and the drunkard the prognosis must be made with extreme care, for assuredly no general rule founded on shattered constitutions will apply. The same may be said of the subjects of bronchitis and emphysema. In the author's opinion, dullness or percussion, with tubular breathing, is to be regarded as unfavorable when it occurs very early in the disease. A total absence of expectoration is both rare and significant, and, on the other hand, a large quantity of frothy, bronchial secretion is to be regarded with suspicion. A continued high temperature of 104° F. (40° C.) from the first is suspicious; and if it reaches 105° F. (40.6° C.) on two consecutive days, without any material decline, it is highly dangerous. Marked acceleration in respiration is no doubt a symptom of danger, and, in the adult, the outlook is serious when a rate of 50 is maintained. A good, steady pulse of 100 or 110 may mean nothing on the third or fourth day, whereas, on the seventh or eighth, it seldom fails to indicate recovery. On the other hand, a rising pulse at this time is a warning not to be mistaken, while the same phenomenon on the third or fourth day may have no real significance. A steadily increasing rapidity of the pulse-rate during the sixth, seventh, or ninth days almost invariably ushers in unfavorable symptoms. A constantly extending area of dullness after the sixth day is decidedly ominous. Delirium is unfavorable in the main, and especially so if constant throughout the day and night and if it occurs early in the course of the attack,—say, on the third day. The pupils are often affected in cases of an unfavorable bias. They may be contracted,—a condition often associated with cyanosis and a small, rapid, and empty pulse,—or they may be dilated and sluggish, when the delirium is generally noisy and irrepressible, with much excitement. Near the end there is not infrequently rigidity of the limbs, which seldom lasts long, and may be associated with spasm of the abdominal muscles and involuntary faecal discharges.

An analysis of 10,000 cases of pneumonia treated in the London Hospital is the subject of an exhaustive paper by Fenwick.<sup>6</sup><sub>Jan. 31</sub> He found that the quantity of albumen in the urine is of considerable prognostic value, and those cases which commence with a severe gastric intestinal attack are twice as liable to end fatally as those which exhibit the more usual initial rigor. The mortality of the disease was shown to be directly proportionate to the severity of the symptomatic fever; and it is but natural to conclude that the presence of high temperature tends to destroy the activity of some vital organ.

Sturges and Coupland,<sup>2006; 16</sup><sub>June</sub> contrary to the general opinion, think that, while no distinction whatever can be made between the left side and the right, apex pneumonia is not so fatal as basic; and, further, that it does not, as is often supposed, subject the patient to the risk of tubercular phthisis.

*Treatment.*—That the heart is the danger-point in pneumonia all are agreed, but as to the mechanism of this danger there is divergence of opinion. Dessau<sup>51 80</sup><sub>Sept.; Nov.</sub> reviews the subject quite fully; and, among the measures suggested, the diversion of venous blood into the liver—a reservoir capable of holding a great quantity of this fluid—is insisted upon. An increase of blood to the liver will also increase its functions, among which is the destruction of the poisonous principles of the blood. With this in view, he suggests the use of calomel, aconite, and veratrum viride. In the heart-failure—so often the cause of death in pneumonia—Thomas<sup>6</sup><sub>July 18</sub> recommends  $\frac{1}{2} \frac{8}{5}$  grain (0.0026 gramme) of strychnia, hypodermatically, every six hours. He believes it possible that strychnia acts directly on the muscles of the right side of the heart, in the same manner as digitalis. A tolerance of the drug appears to exist in pneumonia, and the dose must be large and frequent to secure decided results.

The treatment of pneumonia by large doses of digitalis has an ardent advocate in Petresco.<sup>116 80 169</sup><sub>Feb.; Feb.; May</sub> The doses are simply enormous. He does not hesitate to give as much as 180 grains (11.66 grammes) of the digitalis-leaves in twenty-four hours. He prefers the infusion made with 4 parts of the digitalis-leaves in 200 of water, adding 40 parts of syrup of orange-peel, the dose being a tablespoonful every half-hour. He states that the dose is, in general, very well borne, and that he has never met with a

single case of poisoning. He also states that he has used the leaves obtained from all the best pharmacists in Europe with uniform results. Its antiphlogistic action is only obtained in doses of 75 to 150 grains (4.86 to 9.72 grammes) *per diem*, which can be continued two to four days, according to the severity of the case. A decided and lasting diminution in the pulse-rate is the result of these doses. Fikl,<sup>84</sup><sub>June 13, 20</sub> has also reported very brilliant results from the use of large doses of digitalis. Hershey<sup>9</sup><sub>Aug. 1</sub> gives a hot infusion of digitalis, in tablespoonful doses, every hour, together with 10 grains (0.65 gramme) of calomel at the beginning. The hot infusion acts quickly upon the cardiac muscles, forces the blood through the affected area, and thus to a marked degree overcomes the dyscrasia. This is probably the *rationale* of the action of the drug. Favorable results with large doses of digitalis have been obtained in infants by Murphy.<sup>53</sup><sub>June 13</sub> Chloral and digitalis are always given by Balfour.<sup>36</sup><sub>Nov.</sub> The dose must vary with the age of the patient,—adults, 20 grains (1.3 grammes) of chloral, dissolved in a  $\frac{1}{2}$ -ounce (15 grammes) infusion of digitalis, and subsequently half of this dose every hour until the temperature falls to normal. A tonic should be administered.

The blood-serum of immune animals as a curative agent in pneumonic septicæmia has been further studied by G. and F. Klemperer.<sup>4</sup><sub>Aug. 24, 31</sub><sup>80</sup><sub>Nov.</sub> They found that the pneumococcus, when introduced into the body of an animal, generates a poisonous substance, which can be isolated, and to which the name pneumotoxin has been given. This substance sets up a febrile condition, which lasts several days, after which another substance is found to have been produced, called antipneumotoxin, and it is this substance that cures an attack of pneumonic septicæmia in other animals. Pneumonia in man and in rabbits is produced by the pneumococcus, but the human body is much less susceptible than the rabbit. It was found that the serum taken from pneumonic patients after the crisis could cure pneumonia in rabbits; moreover, pneumotoxin and antipneumotoxin were found to be present in human serum as in that taken from the rabbits. The crisis of pneumonia, according to the authors, takes place as soon as antipneumotoxin is produced in sufficient quantities to neutralize the pneumotoxin. Some attempts have been made to cure patients suffering from pneumonia with the help of antipneumotoxin,

but further observations are necessary before results can be published.

Calomel, in the opinion of Smakovsky,<sup>551</sup><sub>Aug. 28 ; Sept. 16</sub><sup>3</sup> is capable of jugulating or aborting fibrinous pneumonia. This therapeutic effect is not due to a direct action of the calomel on the pulmonary lesions, but to a general antiseptic effect, which destroys the toxic matter circulating through the blood. He employed the remedy after the method of Zakharine.<sup>3</sup><sub>p. 18</sub> In the 2 cases reported he gave 5 to 6 centigrammes ( $\frac{4}{5}$  to  $\frac{9}{10}$  grain) of calomel per hour till the purgative effect was reached. In one patient this effect was obtained after the fifth, in the other the eleventh dose. In both cases this was followed by a lowering of the temperature and diminution of all other morbid symptoms. This amelioration was transformed directly into a crisis, without symptoms of collapse, and with rapid recovery of the patient.

Smith<sup>6</sup><sub>Aug. 29</sub> advocates blisters in the first stage, and believes they act, as suggested by Lauder Brunton,<sup>15</sup><sub>Mar., '70</sub> "as a form of endermatic administration of proteid matters altered in their passage from the vessels to the surface of the skin." He thinks this proteid matter exercises a destructive action on the microbe of pneumonia, and consequently cuts short the attack. The pneumonia of infants should be treated, according to Hirst,<sup>23</sup><sub>Dec., '90</sub> with stimulation—general, respiratory, and cardiac—and the relief of internal congestion; ammonium carbonate, brandy, and digitalis are the staples of medicinal treatment, the last being particularly important, while food is a very necessary aid. To relieve the congestion, he places a cotton jacket over the chest and gives mustard baths. Acetanilid has proven beneficial in the hands of Newhill,<sup>81</sup><sub>May</sub> who gave it to children in 1-grain (0.065 gramme) doses, every two or three hours, and thus secured prompt reduction of the temperature, moisture of the skin, and quiet of the patient.

Mercklin<sup>505</sup><sub>No. 56 ; Oct. 31</sub><sup>53</sup> regards pneumonia as one of the most dangerous complications of diabetes. It appears in this disease without any initial chill, pains, or dyspnœa. He prescribes caffeine, 1 gramme ( $15\frac{1}{2}$  grains) per day, hypodermatically, as a diuretic and heart-tonic; 2 or 3 quarts of milk daily, and  $1\frac{1}{2}$  grammes ( $23\frac{1}{4}$  grains) of sulphate of quinine, together with revulsion to the chest. Exposure to the air is recommended by Coupland.<sup>2</sup><sub>Sept. 26</sub> He thinks the pneumonic patient should be lightly covered, or exposed to the air

beneath a cradle covered by a sheet. The application of cold, in the form of compresses or baths, is of much value.

Delirium in pneumonia is the subject treated by Robert.<sup>53</sup>  
Nov. 14 He considers it one of the most interesting symptoms in pneumonia. When this condition is due to hyperæmia of the brain, he treats it by ice to the head, bromide of potassium or sodium, chloral hydrate, or paraldehyde and aconite. If necessary, abstraction of blood—leeches behind the ears—may be resorted to. When, instead of hyperæmia, there is congestion, it is necessary to employ some means to diminish the stasis, so as to remove venous pressure. When the delirium is of anæmic origin, all remedies of antineurasthenic action find place. Opium takes the lead, with sulphonal and chloral hydrate, unless contra-indicated by feebleness of the cardiac action. In delirium the result of infection the same hypnotics should be employed, in association with salts of quinine, carbolic acid, or creasote. (For pneumonia occurring as a complication of influenza see Section H, this volume.)

#### BRONCHITIS.

*Etiology.*—Grün,<sup>6</sup>  
June 27 has come to the conclusion that bronchitis can no longer be regarded as a direct manifestation in the bronchial tract of a simple chilling of the peripheral circulation. He assumes as a hypothesis that possibly the ciliæ of the tubes act less readily after chilling, although this has not been proven; at least, as far as ciliæ within the body are concerned. Those of the nose, pharynx, etc., do certainly require some certain temperature—at present undetermined—for the proper exercise of their functions; or, they may possess defective power of destroying the bacteria after chilling.

*Diagnosis.*—A peculiar case of sudden bronchial obstruction is reported by Carlyon.<sup>2</sup>  
Dec. 27, '90 The onset was as sudden as the relief following the bringing away of a foreign body composed of calcium and pus. It was elongated, weighed 3 grains (0.19 gramme), and presented the appearance of bone. Abscess of the brain is reported by Köhler,<sup>69</sup>  
Feb. 19 as following putrid bronchitis. It was followed by paralysis, and the patient died in deep coma.

*Treatment.*—The hydrochlorate of quinine injected subcutaneously has been successful in the hands of Saint-Philippe.<sup>24</sup>  
June 21; Oct. 80 He makes use of a solution of equal parts of this agent and of

glycerin and water. In severe cases caffeine should be given subcutaneously, with digitalis and alcohol as stimulants, and aconite avoided. Oxygen inhalations gave better results than injections of ether. Inhalations of peroxide of hydrogen (1 to 10 parts in 100) have been recommended by Gabrilovicz, a weak solution being used at the beginning. The inhalations should be continued for several months.

Acetanilid, according to the investigations of Grün,<sup>24</sup> has the power of preventing the reproduction of the bacillus, which, Grün thinks, may be the cause of the bronchitis. This same power is possessed by thymol and mercuric bichloride; but acetanilid is the least offensive of these agents, and equally effective. This remedy, in doses of 40 centigrammes ( $6\frac{1}{5}$  grains), three times a day, arrested the disease promptly.

Cocillaña is highly recommended by Wilcox.<sup>109</sup> It is a true expectorant. The tincture is objectionable on account of the alcohol, which increases congestion. The fluid extract is given, in 5- to 15- minim (0.32 to 0.97 gramme) doses, every three or four hours. Cocillaña causes less watery expectoration than apomorphia, as it acts mainly on the muciparous glands. The therapeutic effect of cocillaña is slower in attainment than apomorphia, but of longer duration; so that, if prompt impression is desired, we can commence with apomorphia and continue the effect with cocillaña. This drug increases, apomorphia diminishes appetite. Cocillaña is an internal laxative; an overdose causes a severe and persistent nausea. Wilcox treats acute bronchitis as follows: to abort inflammation, pilocarpine in robust men, or apomorphia in the first forty-eight hours; later, cocillaña. In cases of longer standing, muriate of ammonia, and, when the expectoration is scanty, terebene.

Apomorphine has been found by Murrell,<sup>2</sup> when administered on an empty stomach, to produce vomiting much more readily than when administered after meals. He thinks the rate of absorption has much to do with the entire effect. When given hypodermatically, it is absorbed at once; when given on an empty stomach, it is absorbed more rapidly than when mixed with foods. He used it in large doses as an expectorant,  $\frac{1}{2}$  to  $1\frac{3}{4}$  grains (0.032 to 0.114 gramme), three times a day, after meals. This same author made experiments with apomorphine made into ointment

and rubbed into the chest. He found 1 grain (0.065 gramme) to the ounce (37 grammes) of lard or lanolin, half the quantity rubbed into the chest at night, a valued expectorant. This is a fact of very great practical importance, especially in the treatment of children. He found the expectorant effect in many by using the apomorphine as a spray. It was very marked when the drug was used in large doses, and a dose which would act as an emetic, if administered hypodermatically, can be used as an inhalation without giving rise to this result. Apocodeine he found to act as a prompt expectorant when given, in the form of a pill of 1 grain (0.065 gramme) three or four times a day.

A Paris correspondent states <sup>51</sup><sub>Dec.</sub> that terebinthin' oleum is much used in France in the treatment of bronchial trouble. The favorite method is to make a mixture of equal parts of turpentine and olive-oil, which is rubbed, twice a day, on the front and back of the thorax, and down the arms as far as the elbows. The patients are then covered with a light flannel, and the usual dress put on over this; and, if they are fairly well, they are allowed to go out-of-doors.

Sanford <sup>2008</sup> has also had success with terebene and from the salicylate of ammonia. Tuberculous bronchitis has been satisfactorily treated by Gavoy <sup>55</sup><sub>Feb. 28</sub> with iodoform hypodermatically. He gives a quarter of a syringeful of 1 part iodoform to 100 parts of oil of sweet almonds. A febrile reaction is produced in very few cases, and the results obtained in the majority of instances are excellent. The cough rapidly diminishes, muco-purulent expectorations, so characteristic of this specific catarrh, become more fluid, and finally cease almost entirely; alterations in the character and hoarseness of the voice disappear; the lungs become more permeable to air, inspiration becomes deeper; the vesicular murmur acquires another character, and subcrepitant moist râles disappear; nocturnal sweats cease, the appetite returns, and the patient's general health improves.

#### PLEURISY.

*Etiology.* — Patella <sup>99</sup><sub>Dec. 18, '90</sub> states that there are sero-fibrinous pleurisies, due to the encapsulated micrococcus of Fraenkel,—pleurisies with abundant effusions of exclusively tuberculous origin. In tuberculous individuals a pleurisy may sometimes take on a simple non-tuberculous form. There are also pleurisies of chemical

origin, which are still insufficiently known. He thinks it belongs to clinical rather than bacteriological researches to determine the causes and nature of primitive pleurisies. In all cases where bacteriological research shows the presence of the diplococcus of Fraenkel we may hope for the spontaneous resorption of the exudation.

Renzi<sup>99</sup><sub>Dec. 18, '90</sub> has become convinced by his bacteriological researches that pleurisies are caused, according to the prevalent epidemic constitution, sometimes by the diplococcus of Fraenkel and sometimes by the streptococcus; thus, during the last epidemic of influenza streptococcus pleurisies predominated. He admits the curability of tuberculous pleurisy.

Fernet<sup>31 6</sup><sub>May 21; May 30</sub> reports a case, which he terms "typhoid pleurisy," in which the typhoid bacillus of Eberth was found in abundance. In addition to pleuritic symptoms the patient manifested the general signs of enteric fever, excepting the petechiæ. Fernet was of the opinion that the pleurisy was the precursory manifestation of the typhoid fever, and that, like the latter, it was set up by the bacillus of Eberth. Eberth's bacillus has been found in a hæmorrhagic pleural effusion by Charrin and Roger.<sup>73 3 121</sup><sub>Apr. 25; Apr. 22; July</sub> These cultures, very virulent in mice, gave rise, in the guinea-pig, to bloody effusions in the pleura and peritoneum. Bozzolo<sup>69</sup><sub>Jan. 22</sub> observes that the microbe of typhoid fever provokes pleurisy oftener than one would suppose.

*Complications.* — Calcareous degeneration of the pleura is reported by Polaillon,—a subject of great interest to the surgeon and physician, especially in relation to paracentesis and resection of the rib. Pathological research shows it to be first developed through hyperplasia of the subendothelial connective tissue of the parietal layer of the pleura. It is seldom, if ever, of purely pulmonary origin. Traumatism is the most frequent cause of its development. Diagnosis by physical signs is seldom possible. Pulmonary gangrene is given great prominence, as giving rise to putrid pleural effusions, by James.<sup>36</sup><sub>July</sub>

That encysted pleural effusions are quite frequent is maintained by Simon.<sup>73 51</sup><sub>No. 5; July, Nov.</sub> He also claims that the encysting may take place either in the upper or lower part of the chest.

Diaphragmatic pleurisy is reported by Rastamenla.<sup>22</sup><sub>Sept.</sub> The patient was at first supposed to be suffering from broncho-pneu-

monia. He had great dyspnœa ; respirations, 42 ; pulse, 130 ; temperature, 104° F. (40° C.). A physical examination of the chest revealed the absence of broncho-pneumonia, and, by method of exclusion, the diagnosis of diaphragmatic pleurisy was reached. The after-history of the case fully confirmed the diagnosis.

*Diagnosis.*—The movability of the pleuritic exudate is the subject of a study by Baccelli.<sup>596</sup> <sup>41</sup>  
Sept., '90 ; Dec. 18 He thinks the best manner of demonstrating the movement of the exudate is to examine the patient first sitting ; then, prone. The sero-fibrinous exudation changes its position with that of the body when it is small in quantity or when medium in amount, and no strong pressure on the parenchyma of the lungs is occasioned. The thin serous change their position faster than the sero-fibrinous fluids. In the diagnosis of consolidation of the lung from serous or purulent effusions Forchheimer<sup>51</sup> <sup>Nov.</sup> considers the age of the patient as important. He seldom finds serous effusion under 4 years of age, empyema being most common at that period of life. He has been unable to utilize some of the fine auscultatory signs that have been put down,—for instance, the greater transmission of sound in cellular fluids ; they seem to him without value, especially in children.

*Treatment.*—The treatment of pleurisies in children is discussed by Plicque.<sup>73</sup> <sup>Jan. 31</sup> In the early treatment calomel and digitalis are recommended, and a protest against the abolition of the poultice is recorded ; he believes it aids absorption and prevents the progress of the disease to the purulent stage. Tapping should always be done at the first with the aspirator, an antiseptic fluid being used to wash out the cavity. Fluid should be withdrawn slowly and gently, and the introduction of the antiseptic solution (lukewarm boracic lotion is the best for the purpose) performed with equal care and deliberation. No fear need be felt in using large quantities of fluid to flush out the pleura, as much as 5 or 6 litres (5 or 6 quarts) having been employed. If tapping fails to prevent the re-formation of the purulent fluid an incision must be made, and irrigation carried out in the same way. The anterior axillary line should be selected for the incision, instead of the posterior, as in the adult. In case of encysted fluid the incision must be made directly over the point of localization. Frequent and cautious washing out of the cavity is advised in after-treatment. Estlander's operation is rarely necessary in the case of

infants. The question of the treatment of purulent effusions is still much discussed, especially in Germany, where physicians are generally opposed to the operation for empyema, while surgeons favor it. Bozzolo<sup>99</sup><sub>Dec. 18, '90</sub> affirms that, in his experience, simple puncture for empyema has always failed to cure,—here costal resection is always indispensable. (See Section B, vol. iii.)

Massage for pleuritic effusions has an advocate in Poliakow,<sup>113 191</sup><sub>No. 20; Oct.</sub> who has employed massage of the chest in 10 cases of primary pleuritic exudations, 7 being purely serous and 3 sero-fibrinous. The manipulations were made in the direction of lymphatics of the affected region, radiating toward the axilla. The treatment was commenced by light effleurage, but soon brisk rubbing was resorted to, followed by clapottement. The sittings, which took place daily, lasted from ten to twenty minutes. The exudation disappeared in from eight to twenty days, while the other symptoms ceased in from nine to thirty-five days. Massage of the thorax in cases of pleuritic exudation acts as a counter-irritant, similarly to blisters and the cautery, but presents the advantage that it can be practiced every day. Aside from its irritant effects, massage relieves the chest-pains, invigorates the muscles, and augments the volume of the respiratory movements,—an action which exerts marked influence on the absorption of the exudation and the distension of the compressed lung.

Germain Sée<sup>2</sup><sub>Sup., Oct. 24</sub> pointed out that the salicylate of soda, while curing the disease in acute articular rheumatism, prevented serous inflammation. Aufrecht<sup>2</sup><sub>Sup., Oct. 24</sub> lauded it as a remedy for idiopathic serous pleurisies, whatever their origin. This view was subsequently confirmed by Eichhorst,<sup>116</sup><sub>No. 7, '90</sub> Maragliano,<sup>116</sup><sub>No. 7, '90</sub> Stiller,<sup>116</sup><sub>No. 7, '90</sub> Drzewiecki,<sup>116</sup><sub>No. 7, '90</sub> Tetz,<sup>116</sup><sub>No. 7, '90</sub> Déri,<sup>622</sup><sub>No. 26</sub> and Talamon.<sup>31</sup><sub>June 18</sub>

According to Tetz and Talamon, the curative effects of salicylate of soda in serous pleurisy is not less specific than it is in rheumatism.

Stritzover<sup>530</sup><sub>No. 16; Oct. 24</sub> reports 8 cases of exudative pleurisy, in which he gave the drug internally, in 1-gramme (15½ grains) doses, three times a day. As a precaution against collapse the dose was always given after meals, each dose being followed by a draught of good wine. In severe cases the temperature rapidly fell to normal and the subjective condition improved, while, in about a week, the dyspnœa was relieved and the area of dullness lessened.

Every one of the patients completely recovered in about eighteen days. In the eighth case the treatment of four days' duration utterly failed. The symptoms pointed to empyema. An exploratory incision was made, and a sero-purulent fluid escaped. The patient was ultimately cured by excision of the rib. The author holds that it is a most valuable remedy in serous pleurisy, and it at the same time affords a reliable means of determining the character of pleural effusion,—that is, of differentiating serous from sero-purulent or purulent pleurisy.

Antipyrin in pleuritic effusions was the subject of a communication by Clément. <sup>211 112</sup>  
<sub>May 10; Aug.</sub> His attention had been called to this subject three years ago, and his observations were based on some 20 cases. He notes the upper limit of dullness with lunar caustic, and can thus detect the slightest variation in the amount of the fluid. Whether fever be present or not, he at once administers antipyrin, without any other medication whatever. In all cases there was on the following day, or at latest the day after, a marked reduction in the height to which the dullness reached. In some cases this dullness disappeared in forty-eight hours; in 2 or 3 the fluid was completely absorbed in twenty-four hours. In no case was the effect delayed beyond four days. The dose was 1 gramme (15½ grains) every four hours. He thinks antipyrin has a specific action on nearly all inflammatory processes, and it is to this that he attributes its beneficial effect in pleural effusion. The remedy failed when the effusion was purulent or bloody.

#### TUBERCULOSIS.

The bacillus of tuberculosis continues to be considered the direct cause of all forms of tubercle. That there are causes which render the tissues susceptible to the invasion and favorable to the propagation of the bacillus is very probable. The important point, however, the consideration of the etiology of this disease, is the establishment of its mode of invasion.

*Invasion by Inheritance.*—The latest contributions have established inheritance as a source of infection in certain rare instances. Csokor <sup>41</sup>  
<sub>Jan. 29</sub> reports a case of hereditary tuberculosis in cattle. A cow, advanced in pregnancy, had died from pulmonary tuberculosis. Just previous to its death there developed acute eruptions of tubercle upon the serous membranes. In the hepato-

duodenal ligament of the fœtus were found six enlarged lymphatic glands, partly caseous and partly calcified. Microscopical examination revealed numerous tubercles and bacilli. Birch-Hirschfeld<sup>69 786</sup><sub>Mar. 12; Apr.</sub> reported a case of great interest. A woman, seven months pregnant, died of general tuberculosis. Twenty minutes before the death of the mother the fœtus was living. The child was removed by Cæsarean section during the last moments of the mother's life. Efforts at resuscitation failed, the child dying at about the same time as the mother. The autopsy upon the mother showed old caseated tubercular glands about the left supra-renal capsule and thoracic duct, with an acute general miliary tuberculosis. Portions of the liver, spleen, and kidneys of the fœtus transplanted into the abdominal cavity of 2 guinea-pigs and 1 rabbit produced tuberculosis in all 3 animals. Numerous tubercle bacilli were found in the placenta. We have here a very well-established case of tuberculosis communicated directly from the mother to the fœtus *in utero*, through the medium of the placental circulation.

Negative experimental evidence is adduced by Vignal,<sup>3</sup><sub>Aug. 1</sub> who reports the following experiments: A series of guinea-pigs were inoculated with fragments of fœtal organs, or of organs of newborn animals whose mothers were definitely tuberculous. A second series were inoculated with the placenta. A third group were inoculated with fragments of the organs of the mothers. The first and second series of animals were unaffected, while the third series all died of tuberculosis. In another series the tubercle bacillus was injected into the peritoneal cavity of 5 pregnant guinea-pigs. Nineteen guinea-pigs, inoculated with fragments of the liver and spleen from the fruits of these pregnancies, all remained non-tuberculous. From these experiments Vignal concludes that invasion by heredity is very rare.

Haushalter,<sup>184 2</sup><sub>Nov. 15, '90; Sup., Oct. 10</sub> at the request of Herrgott, inoculated guinea-pigs with amniotic fluid—portions of the placenta and fœtal liver—obtained from a woman who had died by suicide in the sixth month of her fifth pregnancy. The animals inoculated with placenta and liver died in a few hours. The third animal, inoculated in the peritoneal cavity with 3 cubic centimetres (46 minims) of amniotic fluid, survived, and was kept under good hygienic surroundings. Seventy-four days after inoculation it was killed; the abdominal and thoracic glands were tuberculous, with

a recent acute miliary tuberculosis of the lungs; numerous bacilli were found. From the fact that the amniotic sac was unruptured, and that care was taken to prevent contamination, Herrgott maintains that the experiment proves that the amniotic fluid in a tuberculous woman may contain the tuberculous virus. The lungs in this case were the seat of acute disseminated tuberculosis.

Baumgarten <sup>69</sup><sub>No. 42</sub> strongly supports the view of the possibility of hereditary infection. He says that those cases where the tubercular process is limited to the bones, joints, or glands, and the cases of pulmonary tuberculosis found during the first months or weeks of life, where the disease is quite markedly advanced, can scarcely offer any other explanation. According to his view, hereditary infection may occur in three ways: Infection from the mother, by the passage of bacilli through the placenta (the possibility of which has been experimentally proven); infection of the ovum from the maternal tissues or fluids; and infection carried by the fructifying sperm.

The embryo being infected, the future history of the bacilli depends upon their own vital energy and the favorable or unfavorable condition of the soil offered by their host during the various periods of the life of the individual. The bacillus can at any time lose its vitality or take on a luxuriant growth. Between these two extremes are the various conditions of its life and growth. The bacillus may remain latent,—that is, simply maintaining its vitality,—with a minimum effect upon the tissues, to take on a more or less luxuriant growth, with corresponding destruction of the tissues, should intercurrent affections, bad hygiene, etc., render the cells of the body less resistant, and offer a more favorable soil for the growth of the parasite. The various organs differ as regards the degree to which they are favorable to the bacillus. Thus, the lungs are most favorable, the muscles very unfavorable, with varying degrees between these extremes. Moreover, the greater formative and nutritive energies of the cells during the foetal life of the individual offer greater resistance to the growth of the bacillus. Very frequently they may become “latent” to take on a greater vital energy, under conditions more favorable to their growth, later in the life of the host. This would explain the fact that, as a rule, in those cases where tubercular infection of the foetus has been observed the affection had advanced but very little.

Landouzy<sup>92</sup><sub>No. 5, p. 411</sub> has repeatedly called attention to the great prevalence of tuberculosis in the very first periods of life. He maintains the opinion, based on clinical observation and experimental evidence in animals, that the children of tubercular parents are frequently infected with the bacillus tuberculosis before birth. The inherited bacilli may remain latent for a varying period; so that the appearance of tuberculosis may not necessarily be observed in early life. He likens congenital tuberculosis to congenital syphilis. He maintains, further, that not only are the tubercle bacilli inherited, but, as in syphilis, the child may inherit a constitutional taint (corresponding to Fournier's "*dystrophie native*" of congenital syphilis) from either parent. This taint he ascribes to the action of the toxines derived from the bacilli on the ovum or sperm.

A very interesting case bearing on this point is reported by R. Sabouraad.<sup>31</sup><sub>Oct. 29</sub> A woman suffering with tubercular induration of both apices, with signs of beginning breaking down in the left apex, was delivered after a normal labor of an apparently healthy female child. Five days after birth the child was apparently in good health, with the exception of a conjunctivitis, which disappeared under treatment in a few days. On the seventh day the child developed meteorism and diarrhœa; on the tenth day general cyanosis with fine râles disseminated over both lungs; death on the eleventh day. The autopsy showed tubercles in both liver and spleen. Histological examination revealed numerous tubercle bacilli.

The mother died, three months after the birth of the child, of a rapidly progressing pulmonary tuberculosis and nephritis. Shortly before death there developed meningitic phenomena and coma; extensive tubercular infiltration of both lungs; mammæ and genitalia showed no signs of tubercle histologically. Unfortunately, the placenta was not examined microscopically. The author concludes that the fact that eleven days after birth the liver and spleen of the child contained tubercles as large as a centimetre in diameter, and partly showing central degeneration, excludes the possibility of infection after birth, and that the case is one of hereditary infection. Unfortunately, he does not mention the condition of the liver and spleen in the mother, or whether there were any signs of a general miliary tuberculosis. This we

believe to be of importance; because, from the evidence furnished hitherto on the question of hereditary infection, the involvement of the foetus has nearly, if not always, occurred after a general miliary tuberculosis in the mother. That under these conditions the foetus may be infected is rational, and can be accepted as a fact, but the possibility of infection of the foetus without the generalization of the disease (where the bacillus may be contained in the blood) is very far from established.

*Invasion by Inhalation.*—Ever since the all-important work of Cornet the opinion has prevailed that infection occurs, in the vast majority, if not in all, cases of pulmonary tuberculosis, from the inhalation of the dried sputum of phthisical patients. In order to ascertain the virulence of tubercle bacilli when mixed with common road-dust Feltz <sup>290</sup> <sup>80</sup> <sub>May 18; June</sub> conducted the following experiments: Sputum was mixed with road-dust and exposed to the variations of the atmospheric temperature for various periods of time. When guinea-pigs were inoculated with this mixture, it was found that the virulence lasted a little more than two months. When the mixture was exposed to the sun, the duration of virulence was extended to six months. (It may here be noted that this is contrary to numerous experiments which show that the influence of the sun's rays is derogatory to the life of bacteria.)

Schnirer <sup>113</sup> <sup>19</sup> <sub>Jan.4; Mar.7</sub> has contributed the following interesting observations: On rinsing the dust from some grapes, he noticed that the water became quite dirty. Ten cubic centimetres (2½ drachms) of this water were injected into the peritoneal cavity of three guinea-pigs. One of the animals died of peritonitis in two days; the other two lived forty-five and forty-eight days, respectively. Post-mortem examination revealed tuberculosis originating at the site of inoculation, and involving the peritoneum, liver, and spleen, with small deposits in the lungs. Microscopical examination revealed numerous tubercle bacilli. He calls attention to this source of danger: the bacilli may be present in the dust of the streets and blown about, lodging on fruit, etc., exposed for sale.

Prausnitz <sup>208</sup> <sub>July 11</sub> inoculated guinea-pigs with scrapings obtained from railway-coaches on the line from Berlin to Meran (a line much used by consumptives). He found that the scrapings of five coaches contained virulent tubercle bacilli, and urges the disinfection of railway-carriages.

It has been repeatedly observed that the bronchial glands of persons dying by accident or other diseases contained well-marked tubercles, and that in some cases of pulmonary tuberculosis tubercles of the bronchial glands was found, which seemed to antedate the pulmonary affection, and to have been the starting-point thereof. A valuable research on this point was communicated by H. P. Loomis.<sup>59</sup>  
Dec. 20, '90 With proper precautions triturations of the bronchial glands of forty-eight persons, who were apparently free from tubercular disease, dying from accident or acute diseases, were injected into the pleuræ of rabbits. Eighteen animals died too soon to determine the result. Eight of them developed tuberculosis, as confirmed by inoculations in other animals. In none of the bodies from which the glands were obtained was tuberculosis found in other organs. In 5 of the cases, where inoculation from the bronchial glands was successful, death had occurred by accident, the organs being apparently healthy. The conclusions to be drawn from this are, that there may be a primary tubercular infection of the bronchial glands, which may remain latent, causing no symptoms of disease. That they may, under favorable circumstances, become a source of general infection, is highly probable.

Northrup,<sup>1</sup>  
Feb. 21 in an analysis of 125 post-mortem examinations of the bodies of tubercular children, demonstrates the comparative frequency of primary infection of the bronchial glands. In 34 cases the primary focus could not be determined, on account of the general dissemination of the lesion. In 20 cases, where the bronchial glands were affected, cheesy masses in the lungs and general tuberculosis were found; in 42 the caseation was found limited to the bronchial glands, and accompanied by general tuberculosis; 13 cases showed caseous bronchial glands, with miliary tubercles in the lungs; in 13 cases tuberculosis of the bronchial glands alone was found; in 3 the point of primary infection was found to be in the mesenteric glands.

From these cases, and from the work of Arnold and Wyssokowicz, Northrup concludes that "tubercle bacilli enter the respiratory passages with the inspired air, lodging in the mucus of the air-passages or the alveoli of the lungs; they may pass through the mucous membrane at any point, be taken into the lymph-spaces, traverse the lymph-canals to the nearest

nodes, and be retained. Their subsequent career depends upon the power of the tissues to withstand their tendency to grow and reproduce the lesion in which they are bred. According to this power of resistance, they will die or remain inactive for a long period, or will develop nodes known as scrofulous, or may lead on when the powers of resistance are depressed, to such changes as have been detailed in the paper."

*Invasion by the Alimentary Tract.*—A very able review of this subject was given by Bollinger.<sup>2000</sup> The upper half of the alimentary tract (mouth, throat, œsophagus, stomach, duodenum, and jejunum) offers an unfavorable site for tuberculosis. The lymph-follicles of the ileum and large intestine are the organs usually infected when the disease has its origin in the alimentary tract. However, primary tuberculosis of the cervical lymphatics in children occurs through infection from the throat. Primary tuberculosis of the intestine combined with tuberculosis of the peritoneal lymphatic glands occurs oftener in children than in adults, the cause for which is probably to be sought for in the feeding of young children with the milk from tubercular cows. The milk of tubercular cows affected with tubercular ulcers of the udders is a source of danger. The milk of tuberculous cows with normal udders has, in 55 per cent. of the experiments, conveyed tuberculosis when inoculated on lower animals.

Inoculation experiments with the flesh of tuberculous cows, more especially where the disease has become very far advanced and general, have given positive results. Galtier<sup>211</sup><sub>Mar. 8</sub> reports that the fluid obtained from the muscles of tubercular animals may contain the bacillus, but adds that in the majority of cases the inoculation experiment gave negative results. Bang<sup>2000</sup> reports the results of his experiments with the milk of highly tubercular cows in whom the udders were apparently healthy. The milk of 4 out of 21 cows produced tuberculosis, when inoculated intra-peritoneally in guinea-pigs. On carefully examining the udders in these cases, however, he found in 3 a beginning tubercular infiltration, so that he obtained but 1 positive case. He concludes that the milk from cows whose udders are not infected is rarely dangerous. In a similar investigation Ernst<sup>2029</sup><sub>7.4.89</sub> obtained 7 positive results from the inoculation of the milk of 14 tubercular cows whose udders were healthy.

Ollivier <sup>3</sup><sub>Feb. 25</sub> reports a very convincing experience, illustrating the danger of infection from milk. At a school for young girls there occurred within three months 11 cases of tuberculosis, of which 5 were fatal; and, with many, the site of infection seemed to be intestinal. Two other pupils of this same school died of tuberculosis, in whom the family history and previous state of excellent health warranted the statement that they would otherwise not have been infected. Upon investigating the cause of this frightful occurrence, it was found that during this period the school had obtained its milk-supply from a cow which had shown, on post-mortem examination, advanced tuberculosis of the lungs and peritoneum, and more particularly of the udder.

The relation between tuberculosis in man and that of the lower animals was fully discussed at the Second Congress for Tuberculosis, in Paris, 1891. Chauveau <sup>3</sup><sub>July 29</sub> <sup>9</sup><sub>Aug. 29</sub> reported, as the result of his experiments, that the tuberculosis of the ox was identical with that of man. His experiments showed that the ox could be inoculated with tuberculosis by the ingestion of tubercular material derived from man; by the intra-venous and subcutaneous injection of fluids from the same source.

In regard to tuberculosis in the gallinaceæ, Straus and Gama-leïa <sup>3</sup><sub>July 29</sub> <sup>9</sup><sub>Aug. 29</sub> are opposed to the view of its identity with human tuberculosis, as upheld by Koch and others. According to their researches, the bacilli found in the two species are altogether different. The cultures of the bacillus found in man are dry, scaly, hard, and do not grow at 43° C. (109° F.). The cultures of the bacillus found in hens are moist and soft, and grow readily at 43° C. (109° F.). Inoculated upon rabbits and guinea-pigs, the bacillus of human tuberculosis produces the well-known lesions of the lung, kidneys, etc., while that found in birds causes the death of the animal without these changes.

Vignal <sup>3</sup><sub>July 29</sub> <sup>9</sup><sub>Aug. 29</sub> finds that pheasants inoculated with pure cultures of the bacillus tuberculosis Kochii, whose virulence had been proven by inoculation upon guinea-pigs, did not become tuberculous after repeated inoculations. From this he concludes that the bacillus of Roux and Nocard, found in birds, is not an attenuated form of the bacillus of Koch, but another species.

Cadiot, Gilbert, and Roger <sup>3</sup><sub>July 29</sub> <sup>9</sup><sub>Aug. 29</sub> contend, as the result of their experiments, that the two bacilli are not identical, but

are of the same origin. In the experiments of Courmont and Dor<sup>3</sup><sub>July 29; Aug. 29</sub> hens were inoculated with mammalian tuberculosis by subcutaneous injection and by the ingestion of tuberculous material. Rabbits and guinea-pigs were inoculated with bird tuberculosis. Their conclusions were, that hens are not absolutely refractory to human tuberculosis, and that inoculation subcutaneously was more certain than that by ingestion.

The widely prevailing opinion that tuberculosis in the dog and cat is a rarity is ably refuted by the work of Jensen.<sup>521</sup><sub>June</sub> He reports, from the literature and his own experience, 44 cases in the dog and 33 in the cat. In the dog the disease attacks more especially the lungs, liver, serous membrane, and kidneys; in the cat, the lungs, kidneys, and digestive apparatus. In both species the affection in most cases was apparently intestinal. Faulkner<sup>521</sup><sub>Mar.</sub> reports 2 cases of equine tuberculosis in which the infection had obviously occurred in the digestive tract. Colin<sup>3</sup><sub>July 29</sub> has successfully inoculated goats.

*Invasion by the Skin.*—Dubreuilh and Curché<sup>457</sup><sub>90</sub> record the case of a robust young woman, who was inoculated upon the finger from washing the handkerchief of a tuberculous patient. There developed small, red nodules upon the third and fourth fingers; after a few days they opened, yielding serous pus. Six days later there occurred enlargement of the axillary glands on that side, followed by suppuration; nodules on the arm and consolidation at the base of the right lung. Tubercle bacilli and pus were found in the nodules. Inoculation upon guinea-pigs gave positive results. That the dissection tubercle is also due to the bacillus of tuberculosis has, since the use of tuberculin, been definitely settled.

*Staining of the Bacillus.*—Biedert<sup>4</sup><sub>Mar. 2</sub> has devised a very useful and sure method of detecting tubercle bacilli in sputum. A tablespoonful of sputum is thoroughly stirred with two tablespoonfuls of water until the whole becomes a homogeneous mass. Four to eight drops of the solution of caustic soda are added; the mass is then boiled in a shallow vessel, gradually adding two to four tablespoonfuls of water until the mass is quite thin. It is then allowed to stand forty-eight hours in a high, conical glass; the solid particles with the bacilli sink to the bottom, and may be examined by taking a small quantity on the platinum-loop. In this way the

bacilli may be detected when only a few are present. The method may be simplified by thoroughly stirring and boiling in a large test-tube about 1 drachm (3.75 grammes) of sputum in six times its volume of a 0.3-per-cent. solution of caustic soda until it forms a thin mass. Allow this to settle twenty-four hours and examine the sediment.

Krönig<sup>4</sup><sub>July 20</sub> hastens the formation of the sediment by the use of the centrifugal apparatus. Dahmen<sup>34</sup><sub>Sept. 22</sub> has published a method which appears to possess even greater advantages. The sputum is placed in a beaker or test-tube, and heated for fifteen minutes in a water-bath; the albumen of the cells is thereby coagulated and, after cooling and slight shaking, the sediment falls to the bottom, carrying the bacilli with it. The fluid above may easily be decanted; the sediment is then rubbed up and finally divided, and then examined for bacilli. This method recommends itself in that it possesses great exactness, is very simple, and requires little time. (See Section M, vol. iv.)

*Pathological Anatomy.*—Heller<sup>2000</sup> presented a review of the subject of predisposition to tuberculosis before the International Congress at Berlin. All normal individuals offer a certain amount of resistance to the growth of the bacillus. This resistance may be diminished; the diminished resistance being local—i.e., at the point of entrance of the bacillus—and general. The bacillus falling upon the epithelium finds here, under normal circumstances, no opportunity for growth. Any preceding injury to the epithelium, however, such as a traumatic irritation, acute or chronic inflammation, seems to render the soil favorable. If from any previous cause the resistance of the tissues has been diminished, there is developed, either at the point of entrance or at the next lymphatic glands, the primary lesion of the disease. The disease may be checked here under favorable circumstances, either by the destruction of the virus or by the cicatrization of the lesion. Only in those cases where we have an excapsulation of the bacilli, where they are distinctly separated from the surrounding tissue, may we speak of the latency of the tuberculosis. In these instances, affections which produce an increase of the circulation of the part, such as acute inflammation, may produce a breaking down of the capsule, and then follows either a fresh local tuberculosis or the generalization of the disease. Acute affections, such as pneumonia,

accompanied by inflammatory exudates which offer a good soil for the growth of the bacillus, may become an indirect cause for the development of the disease. A temporary local diminution of resistance must be assumed in the cases of primary bone and joint tuberculosis. Trauma is probably a causal factor in many cases.

In regard to the general disposition to the development of tuberculosis, diminished nutrition is mentioned as a very important factor. Different ages also show difference of predisposition. According to Heller, between the ages of 10 and 15 there is the least predisposition; of every 10,000 living beings 15 die of tuberculosis during this period. During the first year of life the mortality is 240 in 10,000; in advanced age, 85 in 10,000.

V. Schrön<sup>13 Oct.</sup> has published a very thorough research upon the nature of the tubercular process. The bacilli or their spores are inhaled into the finer bronchioles, and produce here a certain amount of irritation. The first result of this irritation is to cause the immigration of the white blood-corpuscles into the fine bronchial tubes; the cells very soon increase in volume; at the same time there is poured out a finely granular or amorphous exudate, which coagulates and occludes the small bronchioles. The bronchial epithelium then undergoes karyokinesis and proliferates in a centrifugal direction. Thus are formed ampullary projections of epithelium, into which enter the cells which afterward grow to be the giant-cells. These contain the tubercle bacilli and their spores. At the same time there is set up an inflammatory process about the bronchial tubes, which becomes, later, the process known as caseous bronchitis. The tubercle bacilli are found, as a rule, within the cellular elements.

The peculiar predisposition of the apices of the lungs to tuberculosis is ascribed by Zenker<sup>2000</sup> to the diminished respiratory movements of these portions of the lungs and the resulting diminished circulation. Roosevelt<sup>1 Oct.</sup> does not accept the reasons given by the various authors in explanation of the great frequency of tuberculosis in the apices. He claims that if the peculiarity of the respiratory movement of the apices produces the lodgment of the tubercle bacillus at this point the same should occur with other germs and dust-particles. Pneumonia, however, attacks, in the vast majority of cases, the lower lobes; and experimentally he

found it impossible to blow a fine powder into the lobules and air-vesicles,—the portions of the lungs which are, as a rule, first attacked in tuberculosis. He seeks an explanation for the predisposition of the apex in the peculiar anatomy of the pulmonary artery.

In the course of infection the bacilli, either through the lymph-channels or venous system, enter the right ventricle to be propelled into the pulmonary artery. The branch of this vessel which goes to the upper lobes he found to correspond more nearly to the previous course of the vessel, and is given off from the upper wall or convex side of the curve made by the artery in its previous course. The bacilli, acting as small emboli of greater specific gravity than the blood, would run along the upper wall of the main vessel, and by their momentum would be impelled into the branch which supplies the apex. Coursing through the various arterioles in the upper lobes, the bacilli would be arrested at the places where the relatively large arterioles break up into capillaries. This point is found to be at the entrance of the bronchioles into the lobules. Upon these physical grounds Roosevelt seeks to explain both the fact that the disease occurs in the majority of cases in the apices and that it attacks the lobules before the bronchial tubes.

There are, however, very great objections to this ingenious theory. On post-mortem examination of cases where there have occurred tubercular emboli, there is no evidence that the resulting tuberculosis has shown any preference for the apices. Moreover, it is not necessary for the explanation of the frequency of the occurrence in the apex to prove that the bacilli enter this region by preference. The theory that the bacillus may enter all parts of the lung, but that only at the apices, on account of the lessened motion and diminished circulation, is the soil favorable for its growth, is sufficient to explain the preponderance of the disease in this locality.

Kahlden<sup>2</sup><sub>Sup., Mar. 7</sub> describes the changes in the kidneys of phthisical patients, other than those produced by actual tubercular disease in the organ or by amyloid degeneration. The kidney is slightly, if at all, enlarged; the capsule is easily separated; the cortex is but slightly narrowed, invariably showing a slightly yellowish discoloration. The medulla is usually pale and anæmic.

Albuminuria may be entirely absent, or present at irregular intervals in minute quantities. As a rule, there is no cardiac hypertrophy and no œdema. Microscopical examination shows chiefly irregular aggregations of small, round, degenerated cells within the glomeruli. The cells of the tubules show a certain amount of fatty degeneration, and small round-cells are scattered about the intertubular tissue. The changes are degenerative in character, and what is characteristic of them is, that they may be confined to the epithelium of the tubules.

An analysis of 560 autopsies, in cases of tuberculosis at the Brompton Hospital, by W. S. Fenwick,<sup>15</sup><sub>Nov.</sub> showed the average weight of the heart to be  $8\frac{1}{2}$  ounces (46.5 grammes). Twenty-seven per cent. of the cases, however, showed hypertrophy attributable to three causes: (1) resistance in the pulmonary circulation; (2) valvular disease; (3) chronic changes in the kidneys. In 11 per cent. there was found fatty degeneration of the cardiac muscle. It was also demonstrated that the heart is very liable to become the seat of thrombosis, and in 7 cases death was due to the sweeping off of detached thrombi from the right heart into the pulmonary artery. True endocarditis was met with in 43 cases,—in 13 of recent origin. This record goes to show that the association of cardiac disease and phthisis is not so rare as many authors contend. Tubercle bacilli were not found in the endocardial vegetations. In 3 cases the foramen ovale was patent; in 1 the right ventricle was subdivided by an oblique septum, the pulmonary artery taking origin from the upper segment. Thoracic aneurism existed in 7 cases.

Marfan<sup>31</sup><sub>May 21</sub> has observed that in cases of phthisis the arterial tension is lowered throughout the disease. This occurs independently of treatment or fever. With the increased fever or the approach of death the tension is still further lowered. He attributes the cause of this to the toxins secreted by the bacillus. The possibility that it may precede infection and constitute one of the phenomena of predisposition is also mentioned.

In a paper before the American Climatological Association, A. L. Loomis<sup>79</sup><sub>Oct.</sub> presented an analysis of 41 cases in which death had occurred from non-tuberculous diseases where there were found traces of a cured tuberculosis. In 38 cases the lung showed a firm adhesion to the costal pleura. Section showed numbers of fibrous

nodules scattered throughout the apices, continuous with the adherent pleura. Cheesy or calcareous masses were usually found in the centre of these fibrous nodules. Six cases showed small, closed cavities. In a few instances linear cicatrices were observed as marking the site of closed cavities. In two instances the entire upper lobe of the lung formed a homogeneous fibrous mass. Histological examination showed a more or less completely organized fibrous tissue. This tissue had originated either by a small-celled infiltration of the interlobular tissue, of the alveolar walls, or of the tissues about the vessels or bronchi; by contraction, the occlusion of these was produced. Tubercle bacilli were found in one or two sections. The results of inoculation experiments varied.

Coats,<sup>2</sup><sub>Oct.31</sub> reports that in 131 autopsies performed within ten months 28 showed active tuberculosis; of the remaining 103, 24 cases, or 23 per cent., showed evidences of healed tuberculosis. Fowler,<sup>2</sup><sub>Oct.31</sub> in an analysis of 1943 autopsies at the Middlesex Hospital, between the years 1879 and 1886, 177, or 9 per cent., showing obsolete tubercle in the lungs. Subsequent to this, out of 445 consecutive autopsies in the same institution, 42 cases, or 9.4 per cent., are reported by Martin<sup>2</sup><sub>Oct.31</sub> as having shown retrograde tubercle.

*Symptomatology.*—Landouzy<sup>3</sup><sub>No.28</sub> calls attention to the fact that tuberculosis in not a few cases begins with a distinct infectious fever which, with the general symptoms that accompany it, shows great similarity to slightly irregular cases of typhoid. According to the author, the localization of the disease is at this time not discoverable. The condition is one in which the body has become poisoned with the products of the metamorphosis of the tubercle bacilli, producing a condition which he calls "*fièvre bacillaire pré-tuberculeuse à forme typhoïde.*" The differentiation from typhoid may be established by the irregularity of the temperature-curve, the high pulse-rate, absence of roseola, severity of the bronchitis present, the albuminuria, failure of quinine, and the efficacy of antipyrin in subduing the fever. On this last point Landouzy lays particular stress. He regards antipyrin as a specific against the fever of tuberculosis.

Cuffer<sup>92</sup><sub>June</sub> describes the initial or pregranular period of tuberculosis as characterized by two great symptoms,—fever and anæmia,—to which a certain degree of enlargement of the spleen

should be added. This last sign, together with the absence of jugular venous murmur, distinguishes the anæmia of tuberculosis from that of true chlorosis. As the cause of the anæmia in the early stage of tuberculosis are mentioned: (1) the absorption of the oxygen of the blood-cells by the microbes; (2) the leucocytosis brought about in the struggle of the white cells against the bacteria, and (3) the paralyzing action of the products of the bacillus on the blood-cells.

Marfan <sup>3</sup><sub>Aug. 6</sub> presented before the Second Congress for Tuberculosis a paper on the gastric disturbances accompanying pulmonary tuberculosis. He describes three forms: (1) the common dyspepsia of phthical patients; (2) the initial form thereof; (3) the terminal gastritis.

The common dyspepsia of phthical patients is characterized by anorexia, a feeling of discomfort after the ingestion of food, eructations, regurgitations, by gastric cough, and the vomiting succeeding it. The last two symptoms he ascribes to the irritability of the vagus nerves. The other symptoms are due to dilatation or deficient gastric secretion, and are independent of fever. They are probably caused by the toxins formed by the bacillus. The symptoms of dyspepsia are, as a rule, established at the incipency of the pulmonary disease. They may be preceded by the occurrence of a more or less active gastralgia and increased gastric secretions. These symptoms very often precede the occurrence of pulmonary lesions and correspond to the pretubercular dyspepsia of Bourdon. This condition gives place to the form described above soon after the establishment of the disease in the lungs.

The last stages of the gastric affection accompany the formation of cavities. It constitutes a true gastritis, and is characterized by a highly glazed, coated tongue, profound anorexia, and persistent diarrhœa, denoting co-existing intestinal lesion. This stage of the affection is due to a greater intoxication than in the preceding forms.

*Tuberculosis in Children.*—Landouzy <sup>92</sup><sub>Sept.</sub> contends very strongly that tuberculosis is a common cause of death in infants under 2 years of age. Of 69 deaths, occurring during eleven months at the Hôpital Tenon, Paris, in  $21\frac{7}{10}$  per cent. tuberculosis was found, on post-mortem examination, to be the cause of death. In 12 of the 15 cases the disease was generalized; in 3 it was confined to the

lungs and bronchial glands. The statistics of Bolz, of Kiel (39.95 per cent.), are also given. Landouzy desires to bring this very strongly before the public, and looks upon infantile tuberculosis as the chief cause of the depopulation of France.

Aldibert<sup>118</sup><sub>Feb.</sub> reports 2 cases of fatal hæmoptysis in children, aged respectively 3 and 4 years, resulting from an extensive tuberculosis of the thoracic glands surrounding the bronchi and branches of the pulmonary artery. In both cases the branches of the pulmonary artery were perforated, together with a neighboring bronchial tube; perforation in the vessel was caused by tubercular arteritis.

Reinhold,<sup>326</sup><sub>H.5,6</sub> in an analysis of 76 cases of acute miliary disease, occurring at the Freiburg Clinic from 1876 to 1889, describes three forms of miliary tuberculosis: the meningitic form, of which 52 cases are recorded; the typhoid form, 12 cases; and the broncho-pulmonic form, 12 cases.

Joseph<sup>69</sup><sub>No.28</sub> describes 3 cases furnishing additional evidence of the course of acute miliary tuberculosis without febrile reaction. This is a fact of considerable interest, because of the prevailing idea that this disease is almost of necessity accompanied by fever. Reinhold,<sup>326</sup><sub>H.5,6</sub> in his article, calls attention to the same fact. According to the observations of Hager and Leichtenstern,<sup>69</sup><sub>No.32</sub> the febrile form of acute miliary tuberculosis occurs more especially in old persons; occasionally, also, in children the subjects of chronic debilitating diseases.

*The Influence of Other Diseases on Phthisis.*—Chelmonsky<sup>69</sup><sub>Apr.12</sub> reports 2 cases of phthisis in the first stage, the diagnosis being established beyond a doubt, in which all the signs of the disease, including bacilli in the sputum, disappeared after the occurrence of an acute disease; in the 1 case facial erysipelas, and in the other typhoid. He suggests that to the pyrexia attending the acute disease may be ascribed these beneficent results. Dubrandy,<sup>3</sup><sub>July 29</sub> in a paper on the influence of influenza on tuberculosis, says that influenza can only be directly followed by tuberculosis when a pre-existing tubercular infection was present. The influence of *la grippe* on tuberculosis depends upon the following factors: (1) the nature and degree of the tuberculosis; (2) the nature and severity of the influenza; (3) the degree of resistance offered by the patient. Patients in the third stage usually succumb, while

those in the second stage pass rapidly into the third, and death soon follows.

*Diagnosis.*—The importance of an early diagnosis in cases of tuberculosis is apparent. It is in the very early stages of the disease that treatment will be of most avail. It is not at all infrequent that cases of incipient disease with a slight cough, roughened inspiration, slightly prolonged expiration, with, perhaps, symptoms of dyspepsia, are diagnosed as cases of bronchial catarrh or catarrh of the stomach. Thus, through the failure to recognize the disease in its infancy is lost the greatest chance of arresting it. The presence of the bacillus in the sputum, of course, established the diagnosis. For this reason the examination should never be neglected in doubtful cases. Should the first examination fail to reveal their presence it should be repeated, and more especially by one of the methods of precipitation described above. Should these still give negative results, and there still remain a question in the mind of the physician, recourse should be had to the inoculation experiment, preferably the intra-peritoneal injection in guinea-pigs or rabbits. Without a doubt the greatest contribution to our diagnostic knowledge since the discovery of the bacillus is the contribution by its discoverer—Koch—of tuberculin. We shall consider this point, however, in the general consideration of tuberculin.

Emil de Vos<sup>336</sup><sub>May 2</sub> gives a new method for the examination of urine for the bacillus tuberculosis: To pure egg-albumen is added about four times its volume of distilled water; a flaky precipitate is formed, probably of globulin, which settles to the bottom of the vessel. About 10 cubic centimetres (0.65 gramme) of the clear opalescent fluid is decanted off and added to an equal volume of urine. The whole is thoroughly shaken, and heated on a water bath to about 65° to 70° C. (140° to 158° F.), in order to coagulate the albumen. A more or less copious precipitate is thus formed, which, on settling, carries down the bacilli with it, and the sediment may be examined in the ordinary way.

Fussell and Adams<sup>112</sup><sub>June</sub> have a report on the value of the physical signs in diagnosing incipient phthisis. In an examination of 100 healthy symmetrical chests, they found that in 88 per cent. the percussion note was higher pitched over the right apex than over the left. This variation may be equal to or exceed the

changes produced in the percussion note by incipient consolidation at the apices. Moreover, the tactile fremitus and vocal resonance are almost invariably increased at the right apex, the increase being frequently equal to or exceeding that found in commencing consolidation.

Médail <sup>16</sup><sub>Aug.</sub> calls attention to the value of enlargement of the spleen in the diagnosis of tuberculosis in infancy, more especially the acute miliary form. According to the author, in two-fifths of the tubercular infants an enlarged spleen may be detected by clinical examination,—a point which, accompanied by the other symptoms, may be of very great value in the diagnosis of the disease.

*Prophylaxis.*—Ever since the important work of Cornet, which showed the great danger of infection from the inhalation of the dried sputum of phthisical patients, measures for the prevention of infection have been almost entirely confined to such which shall render the sputum of tuberculous individuals harmless.

The government of Prussia has taken notice of this source of danger, and has published a series of “Measures for the Prevention of Tuberculosis,” compiled by the Royal Prussian Scientific Department for Medical Affairs. <sup>4</sup><sub>Dec. 20, '90</sub> We cannot do better than give these in full, since they cover almost the entire ground. They are essentially founded upon the rules laid down by Heller before the Fifteenth Meeting of the German Association for Public Health :—

1. Consumptives should be brought to dispose of their sputum in such a way as to render it harmless, both to themselves and to others. In the execution of this, however, due regard should be paid to the feelings of the patient, and nothing should be done which would render his mental condition more unhappy than it already is. The possibility of a cure, especially in the early stages, exists; but the poor can only be treated in the general hospitals. The prevention of consumption would therefore be greatly aided by the erection of special hospitals for the treatment of the tuberculous poor. It is especially desirable that the larger general corporation or district hospital be relieved by such institutions. When the general hospitals receive tuberculous patients, care should be taken that such patients be separated from the

others. At all events, proof should be furnished that the air of such hospital is free from the bacillus.

2. It is to be hoped that the medical profession take cognizance of the great modern development of our knowledge of tuberculosis, that they may utilize, as family physicians, the many opportunities encountered for the prevention of the spread of tuberculosis. As such are to be mentioned the early recognition of the disease (when it is more easily cured), the removal of the affected from the family, advice against marriage, and the destruction of the sputum. In regard to the latter point, much more can be done by the nurse. Every professional nurse should be furnished with directions for rendering the infectious excreta of patients harmless. The health of the nurse is also to be investigated.

3. Such public places where are to be found many tubercular individuals should be liberally supplied with spit-cups, in order that the sputum may be disposed of in a safe way. Such cuspidors should be large and flat, from fifteen to twenty-five centimetres in diameter, flat-bottomed, and about five centimetres high. They should have edges which are slightly bent round; thick glass, which will stand boiling, is to be preferred as material. They are to be filled with water to such an extent that they are not easily spilled. They are to be emptied into waste-pipes, care being taken to prevent evaporation.

These measures are more especially of importance in garrisons, hospitals, and prisons. Hospitals should, furthermore, observe the following rules: Large cuspidors should be placed in the halls and water-closets and gardens. Each patient affected with a cough should be supplied with a spit-cup (Dettweiler). Notices should be posted on the walls instructing patients to use the cuspidors. All carpets, etc., which are favorable to the retention of sputum should be removed. All dry dusting of walls, floors, etc., is to be strongly forbidden.

Reports on the following points of the various hospitals are to be recommended: (*a*) upon the number of tubercular patients treated, and the number of deaths from that disease, for the last three years; (*b*) upon any cases of infection occurring in healthy individuals or in patients suffering from other diseases; (*c*) on the manner of execution of the above-recommended measures.

In regard to prisons, the following is to be recommended: (1) tuberculosis in any of the inmates should be recognized as soon as possible by examination upon entrance and at repeated intervals; (2) tubercular inmates should be separated from the others; (3) scrupulous cleanliness should be observed in the sleeping- and working- apartments; (4) the use of suitable cuspidors should be enforced; (5) the employment in out-door work and exercise by the inmates, in so far as it is possible, is to be urged. The same points apply also to orphan asylums, seminaries, and convents.

In regard to the schools, the health of the teacher is of greater importance than that of the pupils, especially as regards the younger classes. In young children the disease occurs oftener in the lymphatic glands and brain than in the lung, and, moreover, they do not, as a rule, expectorate. In the older classes, especially boys, the spit-cup is of greater importance.

General rules for schools are as follow: (1) both teachers and pupils should use either the large cuspidors or the smaller spit-cups (Dettweiler); (2) all dust should be removed, but *only* by washing; (3) the attention of coughing children should be drawn to the use of the spit-cups; (4) pupils suffering from diseases of the chest should be encouraged to remain away from school until cured.

Hotels should be required to furnish the larger waiting-rooms, halls, etc., with suitable cuspidors. The bed-linen and rooms occupied by tubercular patients for any length of time, especially when such patients have died within the hotel, should be thoroughly disinfected. Proprietors of hotels, etc., at health resorts frequented by the phthisical, should be called upon to have their apartments thoroughly disinfected at the end of every season.

Upon the railways the use of carpets, matting, etc., should be limited. Both cars and stations should be provided with suitable cuspidors, and they should be frequently cleaned by washing. The smooth, washable covering for seats, etc., is to be preferred to plush. These rules apply more especially to sleeping-cars and cars on direct trains, especially those on lines running to health resorts.

Tubercular midwives are forbidden the practice of their profession. The physician should take care to prevent the introduction of tubercular nurses, governesses, etc., into the families of his practice. In boarding-schools, children's homes, and nurseries all tubercular attendants should be excluded.

The greatest possible cleanliness of shops where foods of various kinds are sold should be enforced.

Factories should observe the following: 1. Cuspidors should be furnished every workman; spitting on the floor forbidden. 2. Such arrangements that will facilitate the treatment of the sick should be instituted. 3. The working apartments should be washed, and not swept dry. 4. The operatives should be taught the danger arising from desiccated sputum. Attention is called to the danger to smokers from tubercular cigar-makers. The danger to the inhabitants other than operatives in small factory towns has been demonstrated.

Town corporations, hospitals, etc., are recommended to provide disinfecting apparatus. It would be of great benefit in many diseases, besides being of great value in the disinfection of the linen, clothes, and bedding of tubercular individuals. The thorough cleaning of houses occupied by tubercular individuals, disinfection of linen, bedding, etc., is to be recommended outside of public institutions. A liberal supply of water should be used by the street-cleaning department.

That there is a certain, though perhaps small, element of danger from the ingestion of meat derived from tuberculous cattle is probable. Burdon Sanderson, <sup>2</sup><sub>Aug. 22</sub> in his address before the Seventh International Congress for Hygiene, held that the consumption of such meat should be watched over by the State and avoided by individuals. A proper inspection is to be desired; but the determination of the period at which the disease renders the meat dangerous is very difficult. The rejection of all tuberculous cattle, whatever their condition, would be scarcely practicable. However, one measure which gives absolute safety from this source of danger, and which is within the reach of every individual, is the thorough cooking of meats. The danger from the use of raw and smoked or partially-cooked meats should be earnestly impressed upon the public by the profession.

Much greater danger exists from the ingestion of tuberculous milk or the products of such milk,—such as butter, cheese, etc. Probably the preponderance of enteric tuberculosis in young children is largely due to this source of danger. With respect to milk itself, the prevention of infection is brought about by the use of boiled milk. As regards the products of milk,—butter,

cheese, etc.,—this measure is scarcely applicable. Safety from infection from these sources lies only in a rigid inspection of milch cows and measures for the prevention of the development of tuberculosis in such animals.

Woodhead<sup>2</sup><sub>Sept. 19</sub> proposes that a regular staff of veterinary inspectors, well trained for such work, be appointed, whose duty it shall be to examine fortnightly all cattle furnishing a milk-supply; and that these inspectors should have the power to isolate all cattle in which the presence of tuberculosis was suspected. Further, that it be made penal for any dairyman to throw into his milk-supply the milk from any cattle thus isolated. Moreover, no phthisical person should be allowed to have charge of any department in a dairy. That the practice of so many of our city dairies of crowding large numbers of cattle in filthy, badly-ventilated pens, and feeding them on “still-slop,” is a great source of danger, there can be no doubt. Strenuous measures should be taken against such practices.

Sandberg,<sup>58</sup><sub>Nov. 28</sub> from a critical examination of the vital statistics of England, during the period 1850–1886, concludes (1) that phthisis has steadily decreased in that country during the above thirty-six years; (2) that in the industrial districts the decrease has been parallel in both sexes; (3) in the agricultural districts the decrease has been greatest in the female sex, and that in that sex the mortality has decreased 50 per cent.

According to Thorne,<sup>15</sup><sub>Feb.</sub> as a result mainly of bettered public sanitation, the mortality from phthisis in England and Wales has been reduced from the annual death-rate of 2602–2336 per million inhabitants, during 1864–1868, to 1752–1541 during 1884–1888. At Leicester, for six years subsequent to the construction of its thirty miles of sewers, the death-rate per 10,000 inhabitants from phthisis was reduced from  $42\frac{1}{3}$  to  $15\frac{1}{6}$ . The author's summary on the influence of the dwelling-house is given:—

*Conditions of Dwelling-House Tending to the Promotion of Tuberculous Consumption.*

1. A soil either (a) naturally damp and cold, or (b) subject to the influence of the rise and fall of a subsoil water lying within a few feet of the surface.

*Conditions of Dwelling-House Tending to the Prevention of Tuberculous Consumption.*

1. A soil which is dry (a) naturally, or (b) freed by artificial means from the injurious influence of dampness, and of the oscillations of the underlying subsoil waters.

2. A dwelling-house, of which either the foundations, the area they inclose, or the walls are, by reason of faulty construction or otherwise, liable to dampness.

3. Such immediate surroundings of the dwelling-house as tend to prevent the free movement of air about it, and its ample exposure to the influence of sunlight.

4. Such structural defects as would prevent the maintenance, within all parts of the dwelling-house, of ample movement of air by day and by night, and free exposure of its habitable rooms to daylight.
2. A dwelling-house so constructed as to be protected against dampness of site, foundations, and walls.

3. Such open space, on at least two opposite sides of the dwelling-house, as shall secure ample movement of air about it, together with its free exposure to the influence of sunlight.

4. Such construction of the dwelling-house as will secure, for its habitable rooms and throughout its interior, free movement of air by day and by night, and the free access of daylight.

An excellent statistical research has been published by W. Halle<sup>2030; 26 Nov.</sup> on the prevalence of tuberculosis in various cities:—

Baltimore . . . . .	37.0 (1870),	24.9 (1889-90),	per 10,000 inhabitants.
Brunn . . . . .	99.0 (1873-74),	76.7	“ “ “
Brussels . . . . .	56.0 (1864-78),	32.4	“ “ “
Budapest . . . . .	69.0 (1872-75),	58.9	“ “ “
London . . . . .	32.0 (1859-69),	18.4	“ “ “
New York . . . . .	41.0 (1870),	33.6	“ “ “
St. Petersburg . . . . .	71.0 (1877-80),	48.8	“ “ “
Prague . . . . .	84.0 (1865-74),	58.3	“ “ “
Rome . . . . .	34.0 (1874-78),	22.5	“ “ “
Vienna . . . . .	77.0 (1865-74),	54.4	“ “ “
Bucharest . . . . .	31.0 (1874),	44.5	“ “ “
Geneva . . . . .	22.0 (1865-69),	35.4	“ “ “
Zurich . . . . .	24.0 (1865-79),	30.3	“ “ “

In a paper on “Military Sanitary Statistics,” compiled with reference to tuberculosis, Wick<sup>84 Nov. 29, 90</sup> gives the following concerning the various armies:—

STATE.	Year.	Cases of Tuberculosis.	Deaths from Tuberculosis.
Austria . . . . .	{ 1870-1882 1883-1886	7.9 pro mille. 4.3 “	2.6 pro mille. 1.4 “
Germany, except Bavaria and Saxony . . . . .	1873-1882	3.1 “	0.9 “
Bavaria . . . . .	{ 1874-1882 1883-1886	3.0 “ 4.6 “	0.6 “ 0.7 “
Saxony . . . . .	1872-1881	1.7 “	0.9 “
Russia . . . . .	1870	. . . . .	3.2 “
India (native army) . . . . .	1885	3.9 “	“
India (Mongoles) . . . . .	1885	9.1 “	3.9 “
Italy . . . . .	1870	2.9 “	1.1 “
France . . . . .	1867-1872	. . . . .	2.2 “
North America . . . . .	1870-1874	. . . . .	1.4 “
England . . . . .	1870-1872	11.8 “	2.7 “

Cornet <sup>58</sup><sub>July 28</sub> has published statistics on the mortality from phthisis in the Prussian prisons. He finds that during a period of fifteen years the mortality among males was 45.82 per cent. of all deaths; in females, 49.33 per cent. Compared with the general population, he finds that under the age of 20 no material difference exists; but between 20 and 40 the mortality is five times that of the general population at these ages. As causes, he mentions insufficient ventilation and exercise, want of variety in the food, and infection of the cells from want of cleanliness.

*Treatment.*—Harris <sup>6</sup><sub>v.1,p.973</sub> calls attention to the fact that, from the stand-point of pathological anatomy, only those cases can be considered as cured in which the tubercular nodules have been replaced either by cicatricial tissue or calcareous masses. Such complete cures are very seldom met with, and, as a rule, are encountered post-mortem, in those cases where death was due to some other disease, and where the existence of phthisis was not suspected during life. Oftener the cases spoken of as cured are those in which we find in the lungs cheesy masses, with perhaps here and there a tubercle in the surrounding tissue. Such cases, it is to be remembered, can at any time be suddenly lighted up, attack other organs, or possibly lead to general miliary tuberculosis. In such cases the process has only been brought to a stand-still. The same thing is true of those cases in which the clinical symptoms subside, perhaps completely disappear, for the time being. According to Harris, such cases constitute most of the so-called "cures" of the experimental therapeutists. It may be suggested, however, that to bring the disease to a stand-still is a step in the right direction, and a persevering use of such remedies which accomplish this may in the end lead to permanent cure.

*Climate.*—Wolff <sup>13</sup><sub>Oct.</sub> has investigated the permanence of results obtained at Brehmer's famous institute at Goerbersdorf. He finds that in 1876 there were treated 512 cases of tuberculosis. Of these, 77 remained behind the next year; 118 remained too short a time to be considered, and 18 died. Of the remaining 300, according to Brehmer's records, 70 were cured; 43 were discharged as almost cured; of these 113, Wolff has heard, at the present time, from 40; 25 report as enjoying good health. After an interval of fifteen years, of the patients suffering from marked tuberculosis, who were discharged from this institute, 8 per cent. can be considered

as cured. The cure is, of course, to be considered as relative, but has lasted for varying periods and up to twenty-nine years. In so far as the patients are concerned, this may be considered as equivalent to a permanent cure. The results he attributes not only to the treatment in the institute, but also to the adherence of the patients to the teachings of Brehmer in after life. At Lippe-springe, Brunn<sup>13</sup><sub>Oct.</sub> reports as the result in 1890: Of 2946 patients, 85 per cent. were more or less improved; of these, 2.1 per cent. were cured and 0.55 per cent. died.

*Medicinal Agents.*—The contributions have been extremely numerous. While the various treatments, for the most part used subcutaneously, following Koch's plan, have been highly satisfactory to their inventors, they can, with few exceptions, scarcely be said to have achieved any definite results. Closely following upon tuberculin, Liebreich<sup>4</sup><sub>Feb.</sub> published his research with cantharidinate of potash and sodium. The solution is prepared in the following manner:—

R Cantharidin cryst., . . . .	0.2 gramme (3 $\frac{1}{10}$ grains).
Potasii hydroxid., . . . .	0.4 gramme (6 $\frac{1}{2}$ grains).
Aquæ dest. (cold), . . . .	20.00 grammes (5 $\frac{1}{4}$ drachms).

M. Sig. : Heat to a clear solution on a water-bath; then slowly add, keeping up the heat, enough cold water to make 1 litre (1 quart).

The usual dose of this solution is from 2 to 10 minims (0.16 to 0.65 gramme). It is to be administered subcutaneously. According to Liebreich the remedy is not a specific against tuberculosis, but is supposed to do good by causing an exudation of serum from the capillaries at the site of the disease. P. Heymann, G. Guttmann, and B. Fraenkel have published cases in proof of its efficacy. On the whole, however, the remedy has thus far proved itself of little value. Gruettner<sup>34</sup><sub>No. 28</sub> saw but little benefit from its use in 10 cases. The injections were very painful, and in 3 cases produced albuminuria. Bogroff<sup>4</sup><sub>No. 28</sub> reports improvement, in a case of laryngeal tuberculosis, after 19 injections given within twenty-six days. Von Rennenkampff<sup>21</sup><sub>No. 26</sub> reports unfavorable results in the clinic at Dorpat. Tranjen,<sup>4</sup><sub>No. 28</sub> basing himself on his theory of analogy between syphilis and tuberculosis, has employed solutions of hydrargyrum aceticum and potassium iodide in liquid paraffin, given subcutaneously. The results have been satisfactory to Tranjen. Burlureaux,<sup>865</sup><sub>Mar.</sub> by the use of a special apparatus and aseptic precautions, has succeeded in injecting large quantities of

creasote (10 grammes— $2\frac{1}{2}$  drachms), in solution with olive-oil, without untoward symptoms. According to Jumon, <sup>100</sup><sub>Nos. 58, 59</sub> this treatment is of benefit in tuberculosis. Gimbert, <sup>363</sup><sub>No. 30</sub> from an experience of five years with the injection of creasote-oil, recommends it. Diamantberger <sup>100</sup><sub>No. 32</sub> recommends a solution of pure guaiacol and almond-oil (equal parts), to which is added 1 per cent. of cocaine. He commences with  $\frac{1}{2}$  gramme ( $7\frac{3}{4}$  grains) of this solution, and gradually increases until 1 gramme ( $15\frac{1}{2}$  grains) daily is reached.

Picot <sup>3</sup><sub>No. 11</sub> uses a solution of guaiacol and iodoform in olive-oil and vaselin, in such proportions that each cubic centimetre of the solution contains 0.01 gramme ( $\frac{2}{13}$  grain) of iodoform and 0.05 gramme ( $\frac{4}{5}$  grain) of guaiacol. The injections are given 1 to 3 per day, and cause very little disturbance, with the exception of a slight disturbance of the digestion, which may make it necessary to intermit the injections for a time. Laborde and Pignol <sup>73</sup><sub>No. 12</sub> recommend a solution, of which each cubic centimetre contains 1.14 grammes ( $17\frac{2}{3}$  grains) of eucalyptol, 0.05 gramme ( $\frac{4}{5}$  grain) of guaiacol, and 0.01 gramme ( $\frac{2}{13}$  grain) of iodoform. This solution may be given subcutaneously up to 12 cubic centimetres (3 drachms) a day without harm. Germain Sée recommends the inhalation of compressed air saturated with creasote and eucalyptol. Richet and Héricourt <sup>3</sup><sub>Jan. 21</sub> injected subcutaneously the serum of the blood of dogs. Lépine <sup>211</sup><sub>Mar. 1</sub> used the serum of goats' blood. It may be mentioned, however, that it has been shown that neither of these animals possesses absolute immunity from tuberculosis.

Shurly and Gibbes <sup>80</sup><sub>Apr.</sub> recommend the inhalation of chlorine-gas and the subcutaneous injection of iodine and the chloride of gold and sodium. Generally, they begin with iodine, in doses of  $\frac{1}{24}$  to  $\frac{1}{12}$  grain (0.0027 to 0.0054 gramme), increasing to  $\frac{1}{6}$ ,  $\frac{1}{2}$ , or 1 grain (0.011, 0.032, 0.065 gramme). When iodism supervenes, the solution of chloride of gold and sodium, beginning with  $\frac{1}{20}$  grain (0.0032 gramme), is given, increasing to  $\frac{1}{5}$  to  $\frac{1}{3}$  grain (0.013 to 0.022 gramme). After a few days' treatment with iodine, cases showing profuse expectoration and large mucous râles should receive the inhalation of chlorine-gas. The solutions consist of chemically-pure iodine, with potassium iodide, pure water, and glycerin. The gold solution is made up of 1 grain (0.065 gramme) of the chloride of gold and sodium to the drachm (3.75 grammes)

of a mixture of water and glycerin. The results have been satisfactory to the authors, and they give some very brilliant clinical histories. It may be recalled, however, that Koch, in his address before the Tenth International Medical Congress, stated that the use of the salts of gold were without real benefit in tubercular animals.

In the "sclerogenic method" of Lannelongue <sup>10 July 7 ; No. 100</sup> a few drops of a 10-per-cent. solution of chloride of zinc are injected at various points about the tubercular nodules (see vol. iii, L-3). Grancher and Martin <sup>55 Aug.</sup> have reported their experience with anti-tuberculous vaccination. The authors employed the methods of inoculating rabbits in series, with cultures of gradually increasing virulence, up to the highest, or test, inoculation. The variation in the virulence of the bacillus was obtained by employing cultures of gradually increasing age, the least virulent being 3 years old, the most virulent being 14 days old. As a result of a careful and prolonged observation of the experiments upon 84 rabbits in different series the authors conclude :—

1. Antituberculous vaccination, though imperfect, exists.
2. The tubercular virus contains a substance which gives immunity more or less perfect, and for varying periods of time, depending upon circumstances. The virus also contains a toxic substance which produces nephritis and paraplegia.
3. Vaccination into the blood in some cases causes the death of rabbits from nephritis, paraplegia, and in some instances tuberculosis.

*Tuberculin.*—Koch <sup>69 No. 46, '90</sup> published the experiments which led up to the discovery and preparation of his tuberculin.

If a healthy guinea-pig is inoculated with a pure culture of the tubercle bacillus the inoculation wound closes, and for the first few days seems to be healing. In the course of ten or fourteen days, however, there is formed a hard nodule, which very soon breaks down, leaving an ulcerating surface until the death of the animal. If, however, an animal—which has four to six weeks previously been successfully inoculated—is re-inoculated, the result is very different. The inoculation wound adheres during the first day, but no nodule is formed. On the next or second day the point of inoculation becomes hard and of a darker color, the process involving the surrounding tissue to an extent of 0.5 to 1

centimetre in diameter. During the following days the skin becomes markedly necrotic, is cast off, and leaves a flat, ulcerating surface, which, as a rule, is quickly and permanently healed without involving the neighboring lymphatics.

Koch found that the same results followed the injection of dead tubercle bacilli. He saw that the injection, in a large quantity, of the sterilized cultures of the bacillus in the healthy guinea-pig produced only a local suppuration. In the tuberculous guinea-pig, however, if the quantity was sufficiently large, death resulted in from six to forty-eight hours. A dose not large enough to produce death may produce an extensive necrosis of the skin at the original point of inoculation of the disease. If still smaller doses were given, at intervals of one or two days, it was found that the health of the tuberculous animals was improved. The inoculation ulcer became smaller, and finally cicatrized (a thing which never occurs without such treatment). The lymphatic nodules diminished in size, the nutrition became improved, and if the disease was not too far advanced it could be brought to a stand-still. He found, however, that the objection to the use of the sterilized cultures lay in the fact that the dead bacilli were not absorbed, but remained at the point of injection and caused more or less suppuration. The material which had a curative effect was something which was soluble, and which entered the fluid of the tissue about the bacilli.

His efforts were then directed to extract from cultures of the bacillus this soluble substance. The result of these experiments—"tuberculin"—is a 50-per-cent. glycerin extract of the cultures of the tubercle bacillus. Besides the active principle, it contains certain salts, coloring matter, and extracts which are of no importance. The active principle is present to the extent of a fraction of 1 per cent.; it is precipitated by alcohol, and may, by means of this reaction, be obtained in a pure state. This, however, has no therapeutic advantage. The active principle belongs to the albumens, and is closely allied to the albuminoses. It differs from the toxalbumens in that it resists high temperatures. It differs also from the peptones in various reactions. (For the chemical reactions and composition, see the original paper.<sup>69</sup><sub>No. 43</sub>) As to the method of its preparation:—

As a culture fluid, Koch uses an infusion of calf-flesh, which

is made slightly alkaline, contains 1 per cent. of peptone and  $\frac{4}{5}$  per cent. of glycerin. Instead of the meat infusion a 1-per-cent. beef-extraction solution may be used. The bacilli should be grown in flasks with a flat bottom, containing from 30 to 50 cubic centimetres (1 to  $1\frac{3}{4}$  ounces) of the culture fluid, and kept at 38° C. (100.4° F.). The very greatest care must be taken that the cultures are absolutely pure, and none but experienced bacteriologists should undertake its preparation. The cultures to be used should be 6 to 8 weeks old. The contents of a number of the culture-flasks are poured into an evaporating dish; this is placed upon a water-bath, and the fluid evaporated to one-tenth its original volume. The heat necessary for this will, of course, completely kill all the bacilli. They are still further removed by passing the fluid through a porcelain filter. The liquid thus obtained contains 40 to 50 per cent. of glycerin, which prevents any decomposition. The fluid preserves its activity for a long time (perhaps for years). Before it is to be issued, however, it should be tested as to its activity by injection in tubercular guinea-pigs at various stages of the disease.

The remedy must be given subcutaneously, and the Koch syringe is to be preferred for this purpose, as more easily kept clean. The syringe is to be rinsed with alcohol before and after each injection. For general use, 1-per-cent. and 10-per-cent. solutions of tuberculin are to be employed. These, made with  $\frac{1}{2}$ -per-cent. carbolic solution, will resist decomposition for some time. However, it is not well to prepare more of the solution than will be used during the week. When the solutions have become cloudy they should be discarded.

The injections are preferably to be made in the interscapular region, as they produce a minimum of local irritation at this point. Upon injecting 0.25 cubic centimetre ( $6\frac{3}{4}$  drachms) of tuberculin in his own arm, Koch experienced the following symptoms: Three to four hours after the injection twitching in the extremities, malaise, some inclination to cough, difficulty in breathing; these symptoms rapidly increased. In the fifth hour occurred a severe chill, lasting for an hour, accompanied by nausea, vomiting, and rise of temperature to 39.6° C. (103.2° F.). After the lapse of about twelve hours the symptoms subsided, the temperature returning the next day to the normal. Some heaviness and

malaise and some soreness or redness at the point of injection remained for a few days, to completely disappear finally. The smallest dose to which the healthy adult reacts is 0.01 cubic centimetre ( $\frac{2}{18}$  grain) or 1 cubic centimetre ( $15\frac{1}{2}$  grains) of a 1-per-cent. solution. The symptoms observed are, slight pains in the limbs, malaise, with, perhaps, a rise of temperature to  $100.4^{\circ}$  F. ( $38^{\circ}$  C.). The same thing is true of adults who are ill but not tuberculous. In children of from 3 to 5 years one-tenth of this amount suffices to produce these symptoms. Entirely different, however, are the results when this amount is injected into the tuberculous individual. There follows a marked general and local reaction. The general reaction consists of a rise of temperature to  $39^{\circ}$  to  $41^{\circ}$  C. ( $102.2^{\circ}$  to  $105.8^{\circ}$  F.), accompanied, as a rule, by an initial chill, pain in the limbs, increased cough, intense malaise, and often nausea and vomiting. Occasionally there was observed slight icterus and an exanthema upon the breast and neck resembling measles. The attack begins, as a rule, four to five hours after the injection, and lasts from twelve to fifteen hours. The reaction may, however, come on later, and be less intense.

Local reaction is best observed in cases of lupus. The changes which occur in these cases demonstrate in a striking manner the action of the remedy upon tuberculous tissue. A few hours after the injection, as a rule before the chill, the points infected with the disease begin to show redness and swelling. During the febrile attack this increases, and may finally become so marked that the affected tissues become brownish red and necrotic. After the subsidence of the fever this swelling gradually diminishes, and, after the lapse of two to three days, may completely disappear. The diseased points are covered with crusts formed from the dried, exuded serum, scabs are formed, and, after the lapse of two to three weeks, these drop off, leaving, in some cases after a single injection, a smooth, red scar. As a rule, however, a number of injections are required. Healthy scar-tissue is not affected. In cases of tuberculosis of the lymphatics, bone, joints, etc., the local reaction consists of swelling, increased pain, and tenderness. Where the affection is superficial, redness is observed. The reaction in the lung and other internal organs, while it cannot be directly observed, shows itself by increased cough and expectoration. This reaction follows without exception, according to Koch,

the injection of 0.01 cubic centimetre ( $\frac{2}{13}$  grain) in individuals suffering from tuberculosis at any point, and is of great value as a diagnostic aid.

Of more importance than its diagnostic virtue are the curative powers of tuberculin. The remedy does not affect the tubercle bacilli, but acts by causing a necrosis of tubercular tissue. It has no influence on tubercular tissue already necrosed,—such as cheesy masses, necrotic bone, etc. The tubercle bacilli contained within the tissue rendered necrotic by the use of the remedy may be expelled with such tissues, or may, under favorable circumstances, effect an entrance into the neighboring tissue. This point is to be remembered, and it is to be recommended that the expulsion of such necrotic masses be aided, where necessary, by surgical interference. The fact that it causes the necrosis of tubercular tissue explains the observation that as we progress in the treatment larger doses are required to produce similar reactions. This is largely due to the fact that the amount of living tubercular tissue has been diminished, and consequently there is less field for this reaction.

Koch offers the following hypothesis in explanation of the action of his remedy: By their growth in the living tissues, as well as in their artificial cultures, the tubercle bacilli produce certain materials which have a derogatory influence upon the cells in their vicinity. Among these products there is one substance which, in a certain concentration, causes what Weigert has described as a coagulation necrosis of the cells of the tissues. This necrotic tissue constitutes an unfavorable soil for the bacillus; they cease to grow, and, under certain circumstances, may be destroyed. However, as soon as the necrosis has reached a certain degree, the growth of the bacillus ceases, and, as a result, this necrotic change is also brought to a stand-point. There is thus established a sort of mutual compensation, which has for its result the fact that the vegetation of individual bacilli is so limited, as is observed in lupus, scrofulous glands, etc. In such cases the necrosis involves only a part of the cell, and by the further growth of the living portion—nucleus—there is formed the characteristic giant-cell. This is the explanation offered by Weigert for the formation of the giant-cells. If now we could by artificial means increase the amount of the substance which causes the necrosis of the tissues, then would this

necrosis be increased in extent, and as a result the surroundings of the bacillus would become less favorable to its growth than is usually the case. Such necrotic masses would become dissolved and, where possible, be excluded with the bacilli. Where this is not possible, the bacilli might be so disturbed that their destruction would follow more often than is the case under the usual conditions. This hypothesis would explain the specific influence on tubercular tissue and the fact that the dosage can be so rapidly increased. The reaction produced in the healthy individual by a large dose is explained by the destructive action of the substance on the healthy cells, possibly the white blood-cells or allied cells.

Following Koch's publication there appeared a number of researches on the histological changes caused by the injections.

According to the histological researches of Riehl,<sup>84</sup> <sup>No. 51, '90</sup> Jacobi,<sup>13</sup> <sup>June</sup> Rindfleisch,<sup>69</sup> <sup>No. 6</sup> Schimmelbusch,<sup>69</sup> <sup>No. 6</sup> Kromayer,<sup>69</sup> <sup>No. 49, '90; No. 8</sup> and Browicz<sup>365</sup> <sup>No. 1</sup> the injection of tuberculin produces an inflammation in the tissues surrounding the tubercle. These observers did not find that tuberculin had any direct necrotic action on the tubercular tissue. The inflammation produced may, according to circumstances, lead to any of the following results:—

1. In certain, perhaps rare, cases we may have a suppuration of the tubercular tissues as the result of this inflammatory action.

2. The inflammation may be of such a nature as to form a distinct line of demarcation about the diseased nodule, resulting in the casting off of this tissue as a slough. This change seems to occur more especially in superficial tubercular ulcers, lupus, etc.

3. The injection produces a slight inflammatory change about the tubercle, which, by repeated injections, becomes chronic. In this form the inflammatory products which are poured out in the periphery of the tubercle may become organized and form healthy contracting scar-tissue, which, as it develops and contracts, produces a pressure,—atrophy in the diseased nodules; or, may form a firm capsule about them which renders them incapable of further growth or damage. This seems to be the most desirable reaction, and it will be a matter of further study to determine in which class of cases this result is to be looked for and the dosage most likely to bring it about.

The phenomena of reaction following the injection of tuberculin, as described by Koch, were, in the main, confirmed by the

great mass of papers following the publication of the remedy. They are, in the main, but a repetition of Koch's descriptions. Very soon there naturally followed upon the first excitements a depressing reaction, from which the mass of observers have not yet recovered.

Virchow,<sup>4</sup><sub>Jan. 12</sub> reported the results of post-mortem examination of the bodies of 21 tuberculous individuals treated with the fluid. These cases, were, for the most part, very advanced cases of tubercular disease. He observed, in a number of them, very marked congestion of the internal organs. In one, a case of tubercular arachnitis, the congestion of the pia was greater than he had ever before seen. Similar hyperæmia was found in the lungs. It was found that the linings of old phthisical cavities presented, in many instances, intense congestion, at times hæmorrhagic infiltration, and even recent hæmorrhages into the cavity itself. Besides these congestions, distinct inflammatory processes were observed; more especially, in the larynx, a severe phlegmonic inflammation was met with. The pulmonary lesions found were of two kinds: either a recent caseous pneumonia, or a simple non-tubercular inflammation. Pleurisy was also met with in some cases. Regarding the caseous pneumonia, Virchow, while he admits that it is found in cases not injected, is yet of the opinion that in these instances it was produced by the injections. The same may be said of the inflammatory form. In addition to these changes, he observed freshly formed and numerous miliary and submiliary tubercles, more especially upon the serous membrane. While the pathological history of miliary tubercle does not permit us to say that these eruptions followed the injection, yet Virchow is strongly inclined to ascribe their causation to the use of the fluid. He also calls attention to the danger from perforation of old tubercular intestinal ulcers.

This publication may be said to have been the starting-point of the reaction which set in and well-nigh overwhelmed the supporters of the remedy. Following upon this, innumerable casualties were reported,—some of them important because of their truth, others important as showing the character of much of the work done during the period of excitement. The statement made that tubercle bacilli could be found in the blood of patients treated with tuberculin was found to rest upon the authority of one who had

used slides soiled with old sputum for his examinations. To the statement that the fluid itself contained tubercle bacilli, Libbertz, Koch's assistant, stated that the fluid possibly contained a few bacilli, but their vitality had certainly been destroyed by repeated boiling. Inoculation experiment confirmed this fact.

That the profession in general has been disappointed in the hopes which first arose from the use of the remedy there is no doubt. To what is this disappointment due? In the first place, there can be no doubt but that, in the intense excitement which followed the first publication, a great many unsuitable cases were treated,—cases in which the powers of vitality had been so diminished that they could not withstand the action of the febrile reactions produced by the dosage then in use. Koch enjoined that we should carefully individualize, and that all the means known to the physician and surgeon should be brought to the aid of the remedy.

Another cause which led to disappointment was the dosage employed at first. There can be no doubt but that this was too large. Koch called our attention very strongly to the process as one of necrosis of the tubercular tissues, and that in order that a cure may take place this necrosis must be produced. The reaction to be desired is that which produces a very slight inflammatory process about the tubercle, which shall lead, as in the cases of spontaneous cure, to cicatrization. There is certainly far less danger in this than in the reaction which suddenly causes the death of a large amount of tissue, and thus permits living bacilli to be carried to other points. It seems that this favorable result is obtained by the use of smaller doses, increased in such a way as to avoid all febrile reactions.

Various investigators have sought to separate, in tuberculin, the curative principle from that which produces the deleterious effect. The work of Hunter may be cited<sup>July 25</sup> in this connection. Klebs<sup>69</sup><sub>No. 24</sub> has also prepared a "tuberculinum depuratum," but the details have not yet been published. Koch, in his last publication,<sup>69</sup><sub>No. 43</sub> says that all his efforts to purify the preparation were without avail so far as the physiological effects were concerned.

As to the method of administration, it is now considered the best practice to give such a dose as shall produce a minimum of local reaction; to inject at longer intervals; to increase the dose

slowly; and thus to retain the specific irritability of the tissues for as long a period as possible. The procedure described below is recommended by Koch as the best. We may add that, in our own experience at the Good Samaritan Hospital, Cincinnati, we have found it to give the best results. In cases of persons who are vigorous, and in whom the disease is not advanced, the initial dose is 0.0005 to 0.001 gramme ( $\frac{1}{130}$  to  $\frac{1}{64}$  grain). In the cases of advanced and greatly debilitated persons even smaller doses may be given. The injections are repeated every two or three days. The dose is not increased until the slight reaction no longer takes place. Increase is to be made very gradually and tentatively, avoiding all febrile reaction. In cases of severe hectic Ehrlich recommends the injection of 0.0003 to 0.0005 gramme ( $\frac{1}{200}$  to  $\frac{1}{130}$  grain), three times a day, and a very cautious increase. By this means the hectic may be made to disappear in eight to fourteen days.

*Diagnostic Value.*—It may be considered as established that the occurrence of local reaction following the injection is proof of the existence of tubercle at that point. The possible exception is leprosy. In regard to the diagnostic value of the general febrile reaction, the question is not yet settled. The weight of the evidence goes to show that, where injections of 0.005 gramme ( $\frac{1}{3}$  grain) or less produce a marked febrile reaction, tubercle is probably present. In weighing this question, we are to remember the great frequency of unsuspected tubercle. Innumerable cases have been recorded where latent tuberculosis has been diagnosed by means of the injection. By its means we may hope to recognize the disease in its very earliest incipency, before bacilli are found in the sputum.

*Therapeutic Value.*—The therapeutic value of tuberculin is still uncertain. Sufficient time has scarcely elapsed to give a definite answer. The pathological report of a few unfavorable results in unsuitable cases has so thrown the balance to the other side that it will delay the settling of the question for a considerable time. The statistics that can be gathered in a year upon such a question can have but very little value. It is to be remembered that a complete cure is a question of considerable time, and relapses are the rule in this disease. Perhaps there is less reason to fear a relapse in cases treated by this method. The favorable results

reported by many competent observers certainly support this view. These results show themselves in the cessation of cough, night-sweats, and hectic, the improvement of the general health and nutrition, increase in weight, diminution of bronchial secretion, râles, and sputum, and, in the most favorable cases, the disappearance of the bacilli from the sputum. Such results have been reported by men thoroughly competent and trustworthy. The statements of such men as Koch, Ehrlich, Grabower, Schmidt, Schede, Fuerbinger, Langenbuch, of Guthrie-Leigh and Watson-Cheyne are of undoubted weight.

This contribution of Koch, to the therapy of the most widespread and fatal disease of mankind is the beginning of a scientific era in therapeutics. It remains true, as Koch first declared, that tuberculin is the best remedy we have for pure and true tuberculosis uncomplicated by septic or other process. It is also true that it is the only remedy that has specific properties. If it could be used just at the beginning of the disease, and if the dissemination of the disease could be prevented by the simple process of destroying or fixing (as in water) the sputum, tuberculosis (pulmonum) would soon cease to be.

#### EMPYEMA.

Three cases of pulsating empyema are reported by Light,<sup>6</sup> of the variety showing an external pulsating tumor,—the so-called “empyema necessitatis.” They presented the usual symptoms, viz., localized subcutaneous swelling or swellings communicating with the pleural cavity, with systolic pulsations synchronous with the cardiac impulse, which may be well marked, energetic, or weak,—usually situated anteriorly between the sternum and axillary line, though found occasionally laterally or posteriorly,—and an extensive purulent effusion into the pleural cavity, nearly always left-sided. On palpation the systolic impulse is easily felt, sometimes more strongly than the cardiac, the pulsation also receding during inspiration and projecting during expiration. On auscultating at the level of the pulsations, one may hear both sounds distinctly. There was excessive displacement of the heart, with rotation on its axis. The condition was formerly confounded with aneurism of the aorta.

The suppurations are secondary in character: according to

Burckhardt,<sup>366</sup><sub>B.31</sub> common in young children,—as inflammation of the middle ear, pericarditis, phlegmon of the neck, pemphigus, and cerebro-spinal meningitis; according to Hagenbach and Crandall,<sup>1</sup><sub>Sept.12</sub> are probably due to a micro-organism derived from empyema or some collection of pus. The pus of these secondary collections has frequently been found to contain a diplococcus strongly resembling that of Demme.

*Treatment.*—The resection of a rib is held to be generally unnecessary by Verebélyi.<sup>84</sup><sub>Jan.3</sub> It is only indicated when, by approximation of the ribs, the free exit of the pus is hindered. The author is greatly in favor of frequent washings out of the cavity with lukewarm 30-per-cent. boracic-acid solution. He has no fear of entrance of air into the pleural cavity. In his treatment the author has cured 70 to 80 per cent. of his cases. (See Section B, vol. iii.)

#### EMPHYSEMA.

Guttmann,<sup>69</sup><sub>Apr.23</sub> reports a remarkable case, where the entire left lung was filled with one single air-bladder. By allowing the light to shine through, it could be seen that the lung contained nothing but air. He found the case unique in his experience. A similar case was reported by Fräntzel.<sup>69</sup><sub>Apr.23</sub> All three of the theories of the causation of emphysema, viz., inspiratory, expiratory, and histological, are believed by Liebermeister,<sup>69</sup><sub>Jan.1,8</sub> to be necessary for the explanation of the disease. A case of subcutaneous emphysema of the neck and thorax is reported by Coats.<sup>213</sup><sub>June</sub> It was the case of an infant aged 7 months. Post-mortem examination showed puffing up of the entire thorax, extending up the neck so as to form a pronounced swelling on both sides, but especially on the left, where it extended on the side of the head. The loose connective tissue was greatly blown up with air, causing it to encroach considerably on the pericardium. The left lung was the seat of interstitial emphysema, the entire interstitial connective tissue being also blown up and infiltrated with air, which, on account of the structure of the connective tissue, was divided into fine vesicles or bubbles. Thus, on looking closely on the surface of the lung, it was possible to trace the outlines of the lobules by the presence of clear, bead-like vesicles.

*Treatment.*—Liebermeister,<sup>69</sup><sub>Jan.1,8</sub> does not consider fresh air and change of climate absolutely necessary. When the heart begins

to fail rest in bed is required, and, if this does not overcome the œdema, digitalis should be given. Three to  $4\frac{1}{2}$  grains (0.19 to 0.292 gramme) of the powder, preferably in the infusion, are given the first day, and continued until 2 quarts (2 litres) of urine are passed in twenty-four hours, or until the action of the drug is indicated in the pulse.

#### ASTHMA.

*Pathological Anatomy.*—Ganglionic asthma is described by Joal,<sup>360</sup><sub>Apr.</sub> who has observed it in those children who have suffered from measles and whooping-cough and the children of neuro-arthritic parents who present a bulbar overexcitability. As to treatment, he considers cutaneous revulsion of much importance,—constant irritation between the shoulders. It is essential to do the work permanently, but not painfully. At the same time, one should combat the bulbar susceptibility, and administer the known anti-dyspnoics.

The neuropathic element in spasmodic asthma has received considerable attention, and there have been many attempts to demonstrate the existence in the asthmatic of an underlying state of nervous instability. Brissaud<sup>92</sup><sub>Dec., '90</sub>;<sup>6</sup><sub>Feb. 21</sub> collates a considerable amount of evidence to show that the (true) asthmatic may be regarded as a neurotic, and hence the removal of the supposed exciting cause, *e.g.*, nasal polypi, can hardly be expected to be curative. The probability of some inherent nervous defect in a disease like asthma, the periodical recurrence of which reminds one of the epileptic nerve-storms, seems so self-evident that it is singular so little attention has been paid to it. The general conclusion is, that asthma is only one manifestation of the general neuropathic tendency, and that the inheritance of nervous disorder is a main predisposing factor in the affection.

Crystals of phosphoric salts have been found in nasal polypi and in the sputum of patients suffering with bronchial asthma. Leyden<sup>11</sup><sub>Oct.</sub> believes this presence in these two conditions to constitute a relation between both disorders, but Loewy<sup>11</sup><sub>Oct.</sub> says that it is not true that they have any relation to asthma when found in polypi, because they are also found in such polypi which have never caused asthma.

Eosinophile leucocytes were found by Schmidt<sup>319</sup><sub>June 20</sub> on microscopical examination of the sputum in bronchial asthma. Ley-

den.<sup>69</sup><sub>Sept. 17</sub> speaks of them as peculiar large cells first described by Ehrlich. The cells are granular, and the granules stain markedly with eosin, which is their characteristic. They are present in the blood in health and disease, but are greatly increased in number in leucocythæmia. Muller and Gollarsch have also found them in great numbers in the expectoration in asthma. Leyden found them present in 6 cases where he examined for them. These cells are larger than pus-corpuscles and contain one or more nuclei. They easily break down, and give rise to heaps of granular matter, which eagerly absorb the eosin stain. That it is only the irritation of the vagus which causes asthma is the claim of Lazarus.<sup>69</sup><sub>May 11, June 18, July 9, Sept. 13; Oct.</sub><sup>11</sup> The author concludes: the attack begins with broncho-spasm and stenosis; then follow the catarrhal symptoms and hyperextension of the lungs. This complex of symptoms is caused by irritation of the vagus occurring in a neurasthenic basis. If an animal is made apnœic by an apparatus invented by the author, and curarized, and the nasal mucous membrane irritated by the electric current, an increase of the intra-bronchial pressure can be observed.

It is the opinion of Brügelmann<sup>57</sup><sub>Aug. 23</sub> that persons suffering from asthma are never affected with tuberculosis. He believes the reason is, that the catarrhal bronchial and alveolar mucous membrane forms a very effectual barrier to the entrance of the tubercle bacilli.

*Treatment.*—The treatment of asthma in children is considered by Blache.<sup>14</sup><sub>Jan. 14;</sub><sup>164</sup><sub>Mar. 12, 19;</sub><sup>19</sup><sub>Mar. 21</sub> He advises that the use of morphia in children should be made with great circumspection. Belladonna, however, is well borne, and can be used for a long time. The tincture of lobelia, in large doses, is recommended. Beginning with 20 drops, the dose may be gradually increased until 3 drachms (11.66 grammes) are taken in twenty-four hours. Grindelia robusta, 15 to 20 drops at a dose. Inhalations of the vapor of pyridin mitigate the severity of the paroxysm. To the iodides, especially the iodide of potassium, he gives the first place as a curative agent. Their efficiency, he thinks, depends upon their influence upon the brain and medulla, regulating nervous discharges. (Why not upon gland absorption?) If not well borne, substitute with tincture of grindelia, arsenic, or inhalation of pyridin or compressed air. Euphorbia pilulifera is reported<sup>176</sup><sub>May</sub> as another new and very suc-

cessful remedy in the treatment of many cases of spasmodic asthma. This is a common weed growing in Australia. It is administered in 20- to 30- drop doses of the fluid extract every four hours. It may be used alone with water, or better with glycerin, which renders it less objectionable to the palate. The addition of half the quantity of fluid extract *grindelia robusta*, prepared with alcohol, will sometimes add materially to the efficiency of the treatment. This remedy is not recommended for the emergency, but for the pathological conditions which lead to the attack. In case the attack is just coming on, Dieulafoy <sup>494</sup> <sub>V.14, No.1</sub> <sup>53</sup> <sub>Oct.13</sub> applies muriate of cocaine, 5-per-cent. solution to the interior of the nasal cavity, or a teaspoonful to the nasal cavity of the throat by means of a spray. If this does not suffice, 6 to 12 drops of pyridin may be inhaled from a handkerchief, or 3 or 4 grammes (46 to 62 minims) may be poured upon a cloth and kept near the patient's chair. Stramonium leaves and nitrated paper may be stuffed into a large pipe, in alternate layers, and smoked during the attack, if it is well under way. If the attack is at its height, morphia injected hypodermatically; in the intervals iodide of potash for fifteen days, then for fifteen days belladonna. If emphysema is present, inhalations of compressed air are recommended. Residence in mountainous and elevated countries is to be avoided. Strong odors are among exciting causes, and should be avoided.

Pearse <sup>15</sup> <sub>Jan.</sub> thinks a person liable to attacks of asthma should be classed with those who have fits of epilepsy and occasional attacks of sick headache. They have unstable nerve-centres, liable to explode their energies at any moment, and exhibit the pathological phenomena peculiar to nerve-storms. Our treatment should be directed to break up this habit morbidly acquired by the nerve-centres, and by prolonged medication to maintain the centres in a state of more stable equilibrium. This is done very successfully in epilepsy, and can also be done in asthma. Pearse gives for this purpose chloral and belladonna night and morning, or at least at bed-time, and finds after a time the attacks diminish in frequency and lessen in severity.

Tincture of conium, in  $\frac{1}{2}$ -drachm (1.97 grammes) doses, every half-hour, until four doses have been taken, has been favorably reported on by Anders. <sup>19</sup> <sub>Mar.7</sub>

Fumes of the bromohydrate of ammonium chloride, in the

hands of Maxwell, <sup>24</sup> <sub>May 31</sub>; <sup>80</sup> <sub>July</sub> have caused the disappearance of the dyspnœa after but few inhalations. Sometimes, if the inhalations are made at the time a dyspnoic attack is threatened, the asthmatic seizure is entirely prevented. In order that the fumes should have a neutral reaction, they should be passed through a wash-bottle. He was first led to the use of this remedy by its favorable action in some forms of bronchitis and naso-pharyngeal catarrh. To obtain these fumes, he employed bromohydric acid of a specific gravity of 1.7.

To calm the nervous action during the attacks, Martinez <sup>925</sup> <sub>v.14</sub> prescribes antispasmodics in combination with anæsthetics, sometimes giving small doses of pilocarpine to relieve the bronchial exudation; after the attack, the iodide of potash, along with lobelia. The former he gives in small doses, in milk, gradually increasing the dose; of the latter, begin with 5 centigrammes ( $\frac{4}{5}$  grain), and increase to 15 centigrammes ( $2\frac{1}{3}$  grains) daily, in pill form. With this mode of treatment the author claims to have had excellent success in 9 cases treated within a year, lessening the severity and prolonging the interval between the attacks.

For the continuous treatment Chisolm <sup>233</sup> <sub>July</sub> employs peroxide of hydrogen in a muriate-of-ammonia inhaler, and so far has found nothing to equal it. He also advises the use of strong coffee—and plenty of it—at meals, and other times of the day, if the patient desires it.

#### MEDIASTINAL DISEASE.

Tuberculosis of the mediastinal glands invading the lungs is reported by Voelcker, <sup>2</sup> <sub>May</sub>, who has had 3 cases—all in children—at the Hospital for Sick Children, Great Ormond Street, London. A remarkable fact was, that all 3 cases were under 2 years of age. He remarks on the frequency of caseous glands in children, having found them present in 110 cases out of the last 300 necropsies he had made at the Children's Hospital. He expressed a doubt as to their occurrence apart from some tuberculous affection.

Cancer of the mediastinum is thought by Steven, <sup>213</sup> <sub>June, Aug.</sub> despite the statistics advanced by Hare, to be nothing like as frequent as sarcoma of that region, or especially lymphosarcoma.

An operation for opening the posterior mediastinum has been lately described and devised by Quenu and Hartmann. <sup>91</sup> <sub>No.3</sub>; <sup>2</sup> <sub>Apr.25</sub> A vertical skin incision is made midway between the spinal border

of the scapula and the vertebral column. After division of the exposed portions of the trapezius and rhomboid muscles and displacement inward of the outer border of the sacrolumbalis, a portion of the entire thickness of each bone, and about three-quarters of an inch in length, is taken from the third and each of the following ribs. An opening is thus formed nearly five inches in length, extending from the first rib to the upper border of the sixth. Quenu states that, by separating the sides of this wound, we may very clearly see all of the posterior mediastinum and all the organs it contains. It is pointed out that this operation is attended with more difficulty and danger on the right side than on the left.

Braun has shown that the pleura insinuates itself on the right side, between the œsophagus and the vertebral column, in order to reach the aorta. On the left side it passes directly from behind forward. It is thought that operative procedure into the posterior mediastinum might be indicated in disease of any organ contained in this part of the thoracic cavity. It is most probably necessary in cases of impacted foreign body in the lower part of the œsophagus. The anatomical conditions are not favorable to removal of malignant disease of the gullet unless the growth is of very limited extent.

#### PNEUMOTHORAX.

A case of spontaneous pneumothorax and pneumopericardium was reported by Lundie.<sup>36</sup> There was present a chronic morbid process in the chest, sufficient to lead ultimately to rupture of the pleura and pericardium, with an almost entire absence of symptoms. The pneumothorax occurred in conditions of apparent health. There was backward displacement of the heart while the pneumothorax was present, and recovery from the pneumothorax without any signs of inflammation or effusion; the occurrence of pneumopericardium, after an interval, also in conditions of apparent health. There was entire absence of irregularity of the pulse, disturbance of the circulation, or interference with the general health, while air was present in the pericardium. Recovery from pneumopericardium resulted without any signs of inflammation or effusion except the small, perhaps normal, amount of fluid in the pericardium indicated by the auscultatory signs.

Pyopneumothorax of subdiaphragmatic cause, consecutive to

the perforation of a round ulcer of the stomach, is reported by Audeoud.<sup>197</sup>  
Oct. Atelectasis of the left lung by compression of the diaphragm and thrombosis of the left femoral vein resulted; false pleural membranes were formed on both sides.

#### PULMONARY TUMORS.

Primary carcinoma of the lung is reported by Belcher,<sup>157</sup> Bul-  
lard,<sup>44</sup> and Boix.<sup>7</sup> "A Case of Carcinoma at the Root of the Left  
Lung, with Extension Through the Intervertebral Foramina; Com-  
pression and Softening of the Spinal Cord" is the title of a report  
by Rickards.<sup>2</sup> Secondary growths were found in the pectoral  
July 4 muscles on the right side, on the inner surface of the ribs, and the  
back of the manubrium sterni, and were similar to those found in the  
spinal muscles. Schwalbe<sup>41</sup> <sup>53</sup>  
No. 56; Aug. 8 has made a most interesting and  
complete report on primary tumors of the lung, dealing with the  
clinical and prognostic aspects of the subject, his statements being  
founded on a large anatomical experience.

#### PULMONARY SYPHILIS.

Syphilis of the pleura is discussed by Nikulin.<sup>4</sup> <sup>2</sup>  
Oct. 5; Oct. 24 He  
contributes 2 cases of syphilitic pleurisy. The first of his cases  
was of that class in which syphilis has set up periostitis, and then  
spread from the bony chest-walls to the pleura,—known as peri-  
pleuritis syphilitica. In both cases the administration of potas-  
sium iodide was followed by a marked beneficial effect. Council-  
man<sup>764</sup>  
Feb., Mar. reports 2 cases occurring at Johns Hopkins Hospital  
during the last two years; both of them were typical cases. Six  
cases are reported by Satterthwaite,<sup>99</sup>  
June 11, 18 who thinks that patholo-  
gists and clinicians have not heretofore realized the importance of  
recognizing pulmonary syphilis.

#### HYDATID CYSTS OF THE LUNG.

Marconnet<sup>73</sup> <sup>15</sup>  
June 27, July 4; Sept. makes some observations on this subject,  
based upon his own case. He suffered from repeated pleural  
effusions, which disappeared with extraordinary rapidity. Pain  
was present on two occasions, the beginnings of two attacks of  
pleurisy. Deformity of the chest was not present. There was  
some cardiac displacement, but the liver was not pushed down.  
The expectoration was at first greenish and blackish, but later it

became red from containing blood. The cyst ruptured without effort, such as cough or emotion. The expulsion of hydatids were not seen until thirteen weeks after the hæmoptysis due to the rupture of the cyst. Fever continued the whole time, contrary to the views of some authors. From personal experience the author advocates inhalations of ether. No antiseptic could penetrate more deeply into the lungs; at the same time, it is analgesic. A case is also reported by Brunon.<sup>203</sup>  
July 13

## DISEASES OF THE HEART AND BLOOD-VESSELS.

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### DISEASES OF BLOOD-VESSELS.

*Diagnostic Value of "Tracheal Tugging" in Thoracic Aneurism.*—Macdonnell, of Montreal, <sup>6</sup><sub>Mar. 7, 21</sub> proves the value of this new physical sign by a careful examination of 25 cases of thoracic aneurism, occurring at the Montreal General Hospital since 1878. To obtain this sign the patient is placed in the erect position, and directed to close his mouth and elevate his chin to the fullest extent. The cricoid cartilage is then grasped between the finger and thumb, and by making gentle upward pressure the pulsation of the aorta will be distinctly felt transmitted through the trachea to the hand, if dilatation or aneurism exist. In some cases the movement of the larynx is so distinct that the pulse can be clearly counted by simply placing the tip of the forefinger upon the pomum Adami and making a slight upward pressure. In 17 of the 25 cases tracheal tugging was noted. In 8 of them an autopsy was obtained, and the following are the conclusions reached: 1. When tracheal tugging is present, the aneurism is so situated as to press from above downward on the left bronchus, or upon that portion of the trachea immediately adjacent to it. As the transverse aorta rides on top of the root of the left lung, lying between the left bronchus and the trachea, any enlargement of the blood-vessel will press upon the trachea or the root of the bronchus, and its pulsations will necessarily be imparted to the larynx. In 8 autopsies of cases in which tracheal tugging had been noted, there was distinct pressure upon the left bronchus from above in 6. 2. Direct pressure on the trachea does not cause tracheal tugging. 3. Tracheal tugging does not occur in aneurisms which do not involve the transverse arch. 4. Tracheal tugging may be present when many other symptoms and physical signs are absent. It is

(B-1)

a very early sign in the history of the case. As compared with laryngeal manifestations, it appears still more valuable, since the tug can be detected by any one accustomed to practice physical examinations, while an opinion as to the paralysis of the cords can be given only by a skilled laryngologist. 5. Tracheal tugging is never present except in aneurism.

*Tuberculosis of the Aorta.*—Flexner<sup>764</sup><sub>Aug.</sub> reports a case of general tuberculosis, in which he found, post-mortem, a tubercular nodule situated in the aorta, two and one-half centimetres below the origin of the left subclavian artery. The nodule was two and one-half millimetres in length and one millimetre in thickness, and projected into the lumen of the vessel. The tubercle was seated directly on the intima; and was made up of three or four masses containing caseous centres. The middle coat of the artery had a perfectly normal appearance. This tubercle must have been produced by the lodgment of the tubercle bacilli on the intima. There was not the slightest endarteritis, the entire aorta being perfectly smooth excepting this tubercle. It is known that tuberculosis of the intima occurs in the arteries of the pia, kidneys, and in the pulmonary artery; but tuberculosis of the aorta itself is extremely rare. Weigert has seen 2 cases.

*Phlebosclerosis.*—It is only recently that any study has been made of the changes which are found in the veins in cases of arteriosclerosis. Herrgott<sup>184</sup><sub>Nov. 15, '90</sub> reviews the recent work done in this line, especially that of Thiébaud. Huchard, in 1889, was the first to apply the name of phlebosclerosis to these changes. Of 87 cases of arteriosclerosis, Huchard found the lesions of phlebosclerosis in 51, but did not make any histological studies. Thiébaud has made a careful histological study of the veins in 12 cases of arteriosclerosis. In the large veins he discovers localized lesions which resemble atheroma of the arteries, and in the small superficial veins a diffuse phlebosclerosis characterized macroscopically by a varicose condition. In the right side of the heart, especially in the valves, he finds well-marked sclerosis. The lesions are localized or diffuse. The former include patches of a white or yellow color, with calcareous deposits, which are situated, as in atheroma of the arteries, in the deeper portion of the inner coat. From these there originates an obliterating endarteritis of the small vasa vasorum. In the second, or diffuse form, the lesions are

found in the small superficial veins of the lower limbs. These vessels are distinguished by varicosity, which is found only as a secondary result of disease in the arteries of the heart.

## ENDOCARDITIS.

*Experimental Infectious Endocarditis.* — Josserand and Roux<sup>211</sup><sub>Sept. 6, 20</sub> report a case of infectious endocarditis in a woman under their care at Croix-Rousse Hospital. The disease began about the 1st of April, 1891, and the patient died four months later, having passed through all the phases of the disease. On the 29th of May a rabbit was inoculated in the auricular vein with a culture of a staphylococcus, which had been made from a drop of blood which had been removed from a finger of the patient. The rabbit died on the 26th of June, and examination showed a bloody effusion in the pericardium and peritoneum, and an endocarditis of remarkable intensity. The leaflets of the aortic valve were swollen and covered with small vegetations. The mitral orifice was almost obliterated by vegetations arising from the mitral valve. The patient died twenty-four days after the autopsy of the rabbit, and her heart showed a precisely similar condition. In view of the difficulty of establishing the diagnosis of infectious endocarditis in many cases, the authors strongly urge the value of inoculation experiments similar to the above, by which a positive diagnosis can be made during the life of the patient.

*Infectious Endocarditis Originating from la Grippe.* — Oulmont and Barbier<sup>31</sup><sub>July 9</sub> report a case of infectious endocarditis which developed in a previously healthy, non-rheumatic woman of 34, as she was recovering from an attack of *la grippe*, in January, 1891. Death occurred in one month, and the autopsy showed extensive vegetations and ulceration of the mitral valve. During life, cultures were made from blood removed from the arm, and these showed the presence of micrococci and streptococci. Preparations made from the mitral valve and other portions of the body after death showed also masses of the same micro-organisms. The presence of a streptococcus in complications of *la grippe* has been demonstrated by many observers, among them Laveran, Bouchard, Weichselbaum, and Leyden. Huchard<sup>3</sup><sub>Sept. 30</sub> observed, during the epidemic of 1889-90, the following phenomena during the course of the disease: Angina, embryocardia, syncope, tachycardia,

collapse, and cardiac asthenia. These different accidents are brought about by the action of *la grippe* upon the arteries of the myocardium and upon the myocardium itself, and upon the cardiac innervation, which is profoundly disturbed by a true parietic condition of the pneumogastric nerves. He has also seen the endocardium affected, and recently Pawinski has described a *grippe* endocarditis. Huchard himself has observed 3 cases of infectious endocarditis due to *la grippe*. Oulmont and Barbier have reported a case of infectious endocarditis, caused by streptococci, during an attack of *la grippe*. In Huchard's 3 cases old aortic lesions rapidly developed into an infectious condition, and death followed in several weeks. These infectious complications ought not to surprise us, for, although the microbe of *la grippe* has not yet been discovered, we know that this disease is a kind of *rendezvous* for a great number of microbes, such as pneumococci, staphylococci, streptococci, etc.

Cases of pre-existing cardiac disease are aggravated for two principal reasons: (1) Because arterial tension falls greatly during the course of *la grippe*; (2) because the pathogenic microbes of *la grippe* can find a lodgment upon an endocardium already diseased, and thus start up an infectious process. The usual location of this process is at the aortic orifice, which may, perhaps, be explained by the nature of the microbe most frequently concerned, the pneumococcus attacking by preference the aortic orifice.

*Microbial Origin of Endocarditis in Chorea.*—The pathology of cardiac lesions occurring in chorea still remain obscure. Frequently they are associated with rheumatism, but sometimes they occur independently. It has been held that in these cases there has always been a rheumatic element, even when the joints were not affected. At present the tendency is to attach less importance to the influence of acute rheumatism, and an attempt is made, at least in some cases, to connect the endocarditis of chorea with microbial infection. In support of this theory, a case is reported by Leredde<sup>118</sup> of a child aged 4½ years, who entered the hospital in the service of Grancher. The child was rachitic and cachectic. Choreic movements were marked. Three weeks after the beginning of the attack a moderate fever appeared, but without any cardiac or pulmonary signs to explain it. A few days later a systolic souffle appeared at the apex of the heart, and was soon followed

by marked enlargement of the heart and a thrill,—evidence of mitral disease. The aortic valve then became affected and albumen appeared in the urine. During this time cultures were made repeatedly on gelatin, from blood taken with careful antiseptic precautions from the fingers. Each of these cultures showed the presence of the staphylococcus albus and the staphylococcus aureus. In a few weeks the fever and the acute symptoms disappeared, and further attempts to secure cultures proved negative. An infectious origin of the endocarditis in this case is quite probable.

*The Connection of Chorea with Heart Disease and Rheumatism.*—In an interesting discussion of this subject,<sup>99</sup> Bullard gave the results of an analysis of 100 cases observed by himself. In 28 of these one or both of the parents had had rheumatism, only those cases being counted as rheumatic in which decided symptoms had existed. Of the patients themselves, out of 100 cases, 17 had articular rheumatism and 4 rheumatic fever (21 severe cases); 9 had pains and more or less doubtful symptoms; while the rest (70) were recorded as never having had rheumatism. In several of these cases the rheumatism immediately preceded the chorea. There was probably severe valvular lesion or endocarditis in 27 cases, and slight cardiac trouble in 16 cases. There was marked cardiac irregularity in 8 cases, of which 4 had valvular trouble, and were counted among the lesions. There were, then, 47 cases in which the heart was not absolutely normal, in 27 of which, at least, there were organic lesions, and probably in many of the other cases there was some slight organic difficulty. Of the 27 cases of severe heart trouble, 15 had chorea for the first time; in 6 cases (not seen during the first attack) the cardiac lesions were found during the second attack; in 3 cases they were found in attacks later than the second, and in 3 cases there was no record of the number of the attacks. Of the 27 cases, 8 had had rheumatism severely and 5 slightly; in 2 cases there was no record upon this point, and in 12 no rheumatism had been noticed. In many of the cases rheumatic symptoms immediately preceded or coincided with the chorea. The author considered two of the principal predisposing causes of chorea to be a neurotic disposition and anæmia, but had no question of the connection of rheumatism with chorea.

Knapp had tabulated 95 cases seen by himself; 39 were boys and 56 girls. He had occasionally met with cases associated with

acute articular rheumatism and endocarditis, but doubted the traditional relation, and had failed to note it in the majority of his cases. In 8 cases there had been acute articular rheumatism, in 5 of which the rheumatism and chorea were closely connected in point of time. Of the 8 cases, 5 had rheumatism during the first attack of chorea, 2 during the second, and 1 during the twelfth. In 25 other cases there were pains, which were of too vague a character to be of importance. In 32 cases the patients had had scarlet fever, and in 2 cases the chorea followed scarlet fever immediately. In 3 cases chorea followed influenza. Such figures, showing acute articular rheumatism in less than 10 per cent. of the cases furnished, he thought a strong argument against the old theory that rheumatism was the cause of chorea. Nevertheless, rheumatism seems commoner in patients with chorea than with other patients. In 16 of his cases cardiac irregularity was noted, and in 5 of these there was also a murmur. In 20 cases there were endocardial murmurs, and in 4 of these the heart was enlarged. In 5 of the 20 cases there was acute articular rheumatism, in 5 others various pains; 14 of the cases of endocarditis came during the first attack, 3 during the second, 2 during the third, and 1 during the twelfth. Three-fourths of the cases of chorea have neither rheumatism nor endocarditis, yet it is probable that acute articular rheumatism and, perhaps, endocarditis are commoner in choreic than in other patients. Scarlet fever is certainly much commoner as an antecedent than acute rheumatism.

Jeffries reported that he had seen 73 cases of chorea during the past three years, 51 of them being girls and 22 boys. In only 4 cases could he get a history of rheumatism. In all there were 12 cases of organic heart disease. In 11 of these the heart trouble was found at the first visit, and in several it must have antedated the chorea; in the other, the heart trouble developed after the chorea had existed for three years. Besides the above, there were a few cases with transitory murmurs,—in all probability, functional in nature. There was but 1 death, and that from acute endocarditis. Townsend found a large number of cases of rheumatism among 148 cases of chorea at the out-patient department of the Boston Children's Hospital. In some cases—put down at first as having a murmur, possibly a transitory murmur, with no enlargement of the heart or any symptoms of organic disease except

the murmur—undoubted organic disease of the heart had since developed.

#### VALVULAR DISEASES.

##### *The Condition of the Left Side of the Heart in Mitral Lesions.*—

Briquet<sup>100</sup><sub>Jan. 20</sub> arrives at the following conclusions: The left auricle is dilated and hypertrophied in mitral insufficiency and stenosis, either single or combined. Dilatation prevails in insufficiency, hypertrophy in stenosis. The left ventricle is neither hypertrophied nor dilated in pure mitral insufficiency or stenosis, but in the latter case its cavity is diminished in size. The left ventricle is neither hypertrophied nor dilated in insufficiency combined with stenosis of the mitral valve. When, in a case of mitral lesion, there exists hypertrophy of the left ventricle, the cause must always be sought elsewhere,—as, for instance, at the aortic orifice, in the arterial system, the pericardium, or the kidneys.

*Pulmonary Tuberculosis with Mitral Insufficiency.*—Chapotot presented to the Medical Society of Lyons<sup>211</sup><sub>May 10</sub> a specimen showing advanced pulmonary tuberculosis co-existing with mitral insufficiency. Lépine thought that mitral disease hindered the development of pulmonary tuberculosis by causing œdema of the lung. To produce the latter condition the lesions must be considerable, but in the present specimen he pointed out that the mitral disease was comparatively slight. Tripier said that numerous cases had proved that severe cardiac lesions antagonize pulmonary tuberculosis, and the two conditions never developed simultaneously. In opposition to Lépine, he maintained that it was cardiac hypertrophy, and not pulmonary œdema, that hindered the development of tuberculosis. Valvular lesions, without hypertrophy, would not prevent the development of tuberculosis.

*Rupture of the Tendons of the Mitral Valve.*—Potain<sup>17</sup><sub>Aug. 25</sub> reports the case of a man of 72, in whom one of the tendons of the mitral valve ruptured spontaneously. There was no special exciting cause, and the history was one of mitral insufficiency, with gradually increasing œdema of the lower limbs and ascites. The heart was not increased in size; at the apex a systolic souffle could usually be heard, but often disappeared, without any apparent explanation. The patient soon developed purpura and gangrenous patches, and died of exhaustion. The autopsy showed mitral insufficiency, caused by the rupture of one of the tendons of the

mitral valve at its insertion. Sometimes the tendon floated in the ventricular cavity and sometimes between the leaflets of the valve. The hydrostatic test showed that mitral incompetence was present only in the latter case, and that the presence or absence of the souffle was thus explained by the position of the tendon. The edge of the mitral valve and the ruptured tendon were atheromatous, and in the latter there was a calcareous deposit.

Cases of rupture of the tendons or valves are quite rare, and can only be suspected when valvular incompetence develops immediately after a severe strain. The rupture is often accompanied by severe pain, pulmonary congestion, cyanosis, and sometimes by speedy death.

The aortic valve is the most easily ruptured, and the mitral valve is much more resistant. Rupture of the tricuspid valve is the most rare, and has been observed in only 3 cases. This valve is so constructed anatomically as to become insufficient when the pressure becomes too great. Usually, only one or two tendons rupture, but sometimes the whole valve yields. In some cases the papillary muscles themselves, and even the columnæ carneæ, are ruptured. The rupture may be the result of traumatism or of sudden exertion, or it may occur spontaneously, without the slightest effort or shock. The tendons are usually found to have become previously diseased. Rupture during exertion is usually explained as the result of increased pressure in the aorta, due to compression of the thoracic organs by the violent contractions of the respiratory muscles. Potain, however, points out that increased pressure in the thorax alone is not sufficient to cause rupture, because the pressure is equally distributed, and is applied to the superior surface of the mitral valve as well as to the inferior. Rupture is caused by the increased pressure in the aorta, which is brought about by the sudden and simultaneous contraction of all the muscles of the body.

*Aortic Insufficiency.*—A specimen showing a very rare cause of aortic insufficiency was exhibited by Osler at a meeting of the Johns Hopkins Medical Society. <sup>764</sup>  
Dec., '90 The incompetency was caused by adhesion of the free border of the intercoronary segment of the aortic valve to the wall of the aorta, leaving only a small slit, four millimetres in length, through which the sinus communicated with the artery. The intima of the aorta was extremely

roughened, with large, flat, atheromatous plates. The specimen came from the body of a woman aged 46, who had never had rheumatism or any serious illness, and who had not taken alcohol to excess. A similar case is reported by Achalme,<sup>7</sup><sub>Jan.</sub> occurring in a woman aged 52, who had never had rheumatism or any other sickness. There was atheromatous and calcareous degeneration of the aorta, and the free border of the posterior segment of the aortic valve was firmly adherent to the wall of the aorta, forming a small cavity, completely isolated from the aortic canal. The cavity was filled with a blood-clot.

## ANGINA PECTORIS.

This subject was discussed by the Medical Society of London, February 9, 1891.<sup>2</sup><sub>Feb. 14, 28, Mar. 14</sub> Douglas Powell spoke of a vasomotor form of angina, which was of comparatively recent discovery. The prognosis, in such cases, must depend largely on the actual condition of the heart. He regarded the vasomotor disturbance as an essential factor in the majority of cases of angina pectoris, just as bronchial hyperæsthesia was in cases of asthma. He believed it to be possible for the heart to succumb to these attacks without itself being affected with any obvious lesion. A fatal issue is rare in these cases. Though physiologists maintained that when systemic arterioles were contracted by cold the viscera were dilated, and *vice versâ*, yet it was highly probable that under certain conditions of chill and emotion the whole arterial system might undergo contraction. In angina pectoris gravior, on the other hand, the vasomotor disturbance is associated with degenerative cardiac disease. He criticised the view that the disease was necessarily caused by, or associated with, disease of the coronary arteries. The prognosis in the first group was comparatively favorable, the probability being that death would ensue from some other cause, such as cerebral hæmorrhage, while in the last group an almost certainly fatal result might be anticipated within a short period. For prognosis and treatment it was important to make out the precise condition of the heart in respect of size, position, and power. Nitrite of amyl and nitro-glycerin were of great value in the treatment, especially in the graver cardiac cases. In the first group they required to be associated with nervine tonics and sedatives, while in the second group carminatives and stimu-

lants were of especial value. In conclusion, he described a syncopal variety of angina rarely met with, except in persons over 65, and then usually associated with gout. Undue acidity of the blood might be concerned in its causation. The attacks were often associated with dyspepsia, and the treatment indicated was careful feeding and gentle exercise.

Broadbent said he had been unable to make up his mind as to the condition of the heart during the paroxysms. Sometimes the pulse was irregular and small; sometimes there was high arterial tension, at other times not; while occasionally the pulse was practically unaffected throughout an attack, even of great violence. It was especially in those cases due to weakness of the heart that the great danger lay. He pointed out that vasomotor resistance alone would not be sufficient to determine an attack. The proportion of cases of high arterial tension without angina pectoris was very much greater than the proportion of fatal cases of angina in which there was no disease of the coronary arteries. With reference to the neurotic theory, the vast majority of anginal cases occurred in the non-neurotic sex, it being extremely rare in women. They ought, therefore, to beware of attaching too much importance to an unexplained neurosis.

Grainger Stewart declined to admit the explanation that the pain was of muscular origin, due to a contraction similar to that which occurred in the legs in cramp. The regular action of the heart during the attacks, which was often observed, negatived this idea, and, besides, there was no post-mortem evidence pointing to any such condition of spasm. He failed to attach any meaning to the expression of spasm of the heart, and urged that the pain presented a very close resemblance to that met with in epileptiform neuralgia. His idea was that the pain was caused by some change that had taken place in the terminations of the nerves which regulated the action of the heart. Lauder Brunton observed that much help might be obtained from the analogy, pointed out by Grainger Stewart, between the heart and the bladder. Both were hollow muscular organs, contracting and dilating at fairly regular intervals and expelling liquid contents. In both, slight distension formed a stimulus to contraction, but if the distension became excessive, it might cause pain, varying in amount from slight discomfort to extreme agony. The sensation of pain, he said, was always

central, for it depended on a condition of the brain which might be excited by a peripheral irritation like a diseased joint, but might exist quite apart from any peripheral disease, as in hysteria. A mixed condition might exist which was both central and peripheral, as in the vesical crisis of locomotor ataxia; and possibly a similar condition might occur in the heart. Unusual distension, either of the bladder or the heart, not only caused contraction in them, but, through the nervous system, lessened the resistance of the sphincter in the case of the bladder, or of the arterioles in the case of the heart. Disturbance of this nervous relationship might cause excessive distension or pain in either organ apart from organic disease, giving rise to spasmodic retention or vasomotor angina. But, while the spasmodic character of angina pectoris indicated its nervous origin, it was so frequently associated with diseased coronary arteries and fatty heart, that these evidently played a great part in its causation. Angina pectoris might be said to be due neither to high tension alone nor to weak heart alone, but to weakness of the heart in relation to the resistance it had to overcome; and it might be brought on by weakening the heart, or by increasing the resistance, or by both together. In tracing out its pathology, the analogy with the bladder was useful. The resistance which the heart had to overcome depended upon the contraction of the systemic arterioles. Of these, there were three subdivisions,—cutaneous, visceral, and muscular,—and the latter was more important in relation to the attacks of angina. One of the most striking symptoms of angina was the ease with which it was brought on by muscular action. The first effect of this was to prevent the passage of blood through the muscles and to raise the tension, although afterward the vessels of the muscles dilated and the tension fell. To this primary rise Brunton attributed the occurrence of anginal attacks on exertion; and their passage off, if exertion could be continued, was, he considered, due to the subsequent dilatation of the vessels of the muscles, with consequent fall of blood-pressure and lessened resistance. He thought that atheroma of the coronary arteries was so powerful in causing angina because it prevented the supply of blood to the heart being increased on exertion, as it ought to be in muscles generally. The pain of angina he considered to be due to distension of the heart, and its more common occurrence in the left than the right side of

the heart to be due to the greater ease with which the tricuspid valves became incompetent than the mitral when the ventricles become dilated.

Angina pectoris was very rare in children. But 1 case was recorded, of a boy aged 14, in whom there was aortic regurgitation and mitral stenosis; and another, in a boy aged 11, where there was ossification of the auriculo-ventricular groove,—conditions which would prevent dilatation of the mitral orifice and insufficiency of the valves. He agreed with the previous speakers in regard to the necessity for the elimination of waste products, and also for restricted diet in gout, and for the use of iron and arsenic in feeble heart; but he regarded the nitrites as the most efficient remedy during a paroxysm, and, on the whole, iodide of potassium as the most useful in the interval. He showed a tracing which appeared to indicate that it lessened the rise of blood-pressure in exertion, and mentioned a case illustrative of its remedial action.

J. Mitchell Bruce said that he had seen a great many cases answering to the description that had been given of vasomotor angina, but he did not think that they were really cases of this kind; indeed, he was of the opinion that such cases were very rare. Gairdner, of Glasgow, also expressed his inability to recognize the angina pectoris vasomotoria of Nothnagel as a true clinical description, and he thought that the term was positively misleading. The vasomotor element, if present, was distinctly subordinated to organic changes in the heart.

*Treatment.*—Huchard <sup>25</sup><sub>Feb. 20</sub> gives the following directions, first in regard to the attack itself, and then for the interval between the attacks:—

*Treatment of the attack:* 1. Relieve pain, preferably by morphine; but if this is not tolerated, use cocaine. 2. Arrest the attack and produce vasomotor dilatation, either by inhalations of nitrite of amyl or hypodermatic injections of nitro-glycerin,—preferably with the former, owing to its more rapid action. *Treatment of the interval:* 1. *Symptomatic*—The arterial tension may be kept down by daily small doses of nitro-glycerin or by nitrite of sodium. Another valuable drug is potassium iodide, taken over a long period. 2. *Causal*—(a) If the attacks are of neuralgic origin, employ nervous sedatives, such as chloral, bromides, hydrotherapy in the form of the various saline or medicated baths;

(b) if of rheumatic origin, the best medicine is salicylate of soda ; (c) if there be well-marked arteriosclerosis advise externally the points of cautery over the sternum, or blisters, and internally the use of the alkaline iodides. 3. *Hygienic*—(a) Prevent moral shocks, overexertion, constipation ; (b) avoid tobacco ; (c) advise a restricted diet, consisting largely of milk or vegetable foods ; (d) combat such conditions as alcoholism, saturnism, arthritis.

#### MYOCARDIAL DISEASE.

*Prognosis of Structural Diseases of the Heart.*—In discussing this subject, Broadbent<sup>6</sup><sub>Mar. 21</sub> considers only hypertrophy, dilatation, and fatty degeneration, the other forms of structural alterations, such as cancer, gumma, abscess, aneurism, and localized fibrotic induration, being rare and almost unrecognizable during life. Even the commoner forms are obscure in their diagnosis and prognosis as compared with valvular lesions, and the post-mortem examination often leaves us in the dark. In one patient fatty degeneration has apparently proved fatal at so early a stage that the naked-eye characteristics of the condition are scarcely perceptible ; in another the change has proceeded so far that the muscular fibres have almost disappeared, so that it is scarcely conceivable how life has been sustained through the intermediate stages of disintegration. So with regard to dilatation ; there is no fixed relation between the degree of enlargement of the cavities and thinning of the walls found after death and the interference with the circulation observed during life. If, therefore, we could make out, with great exactness, the dimensions of the heart, the size of its separate chambers, and the thickness of their respective walls, which is no easy task, we could not, on these grounds alone, compare one case with another and decide on the relative danger. Many other considerations of extreme importance will come into the estimate,—the functional vigor of the muscular walls, as well as their thickness ; the liability to palpitation, the state of the vessels, the degree of peripheral resistance, and the presence or absence of reflex irritation of the heart from gastric or other derangement. An early recognition of these changes is often of greater service than in the case of valvular affections, since it reveals also the tendencies which are in operation, and often at a time when they can be successfully combated by treatment. Too often, however,

the vague term of "weak heart" is the only diagnosis ventured upon.

*Hypertrophy.*—The question of prognosis in relation to hypertrophy mostly resolves itself into this: whether the compensation is adequate and efficient, and how far it promises to be durable. Compensation is efficient when there are no symptoms of embarrassment of the circulation, and when the heart responds to all ordinary calls upon it without undue shortness of breath or respiratory distress. The effects of exertion are an important criterion, but due allowance must be made for the greater liability to breathlessness which is natural to some individuals, or is produced by bodily conformation, or results from a sedentary mode of life. Failure of compensation may be indicated by prolongation of the interval between the first and second sound, the systole requiring more time than under ordinary circumstances to complete itself, and thus the ordinary period of repose and reconstitution of the muscular fibres of the ventricle is shortened and their nutrition must in time suffer. During systole the blood is squeezed out of the walls of the heart, and it is during the diastolic relaxation that it obtains free access to the cardiac fibres. Another evidence that the heart is yielding to the strain of overwork is reduplication of the first sound, and when this is well-marked the prognosis is serious.

*Treatment for hypertrophy itself* is out of place, and the restriction to low diet or the use of aconite is sometimes dangerous. We have really to consider not the treatment of hypertrophy, but the treatment suggested by the hypertrophy. It may be necessary to diminish the volume and improve the quality of the blood by appropriate diet, hygiene, and tonics. It may be desirable, also, to diminish the resistance of the arterio-capillary net-work by aperients, eliminants of various kinds, and by relaxants of the arterioles and capillaries, such as nitro-glycerin and the nitrites. By these means the work thrown upon the heart is reduced, and, if necessary, the heart may also be strengthened by strychnine and digitalis.

*Dilatation.*—The special characteristic of dilatation is, that the ventricle does not complete its systole, but only expels a portion of its contents. In well-marked cases the chambers of the heart are always full, and, little blood being received and expelled, there

is a stagnation in the auricles and ventricles, which may allow of the deposition of fibrin among the fleshy columns. Dilatation is usually understood to be the result of a gradual yielding of the walls of the ventricles. It is often supposed, also, when dilatation exists, that it is an established and more or less unvarying or progressive condition, but it is more likely that the weakly ventricles give way from time to time under stress, and fail to recover perfectly. Acute dilatation is more common than is generally supposed, and there are grounds for supposing that it has been induced at once in a heart not previously affected. A common cause of dilatation is anxiety. The combination of overwork, excitement, worry, and trouble, often met with in city life, brings us many cases of cardiac dilatation among men, and domestic anxieties have the same effect among women. Among special causes of dilatation noticed by the author have been injudicious hydropathic treatment, the so-called "Banting" method of reducing obesity, and the inhalation of the fumes of a powder for the relief of asthma.

*The diagnosis of dilatation* is comparatively easy; but accurate prognosis requires, in addition to an estimate of the dimensions of the heart and the relative degree of dilatation and hypertrophy, a consideration of the possibility of an hereditary tendency to weakness of the heart or of exhaustion due to an unhealthy mode of life, or to protracted emotional strain, or to a premature loss of nutritional value of the tissues generally. Facts of this kind are not revealed by physical signs, but are to be ascertained only by careful inquiry. There are few tendencies which run more strongly in families than those which are manifested in the heart and vascular system, whether to high arterial tension, with the effects on the vessels and heart which follow from this, or to dilatation and weakness, or to degeneration; and a prognosis otherwise not unfavorable might have to be instantly revised on learning that the father and an uncle or two, or a brother, had died at about the patient's age, from heart disease. Finally, the response to treatment will speedily afford an indication of the utmost value.

*Treatment of Dilatation.*—We have to deal at the same time with defective propulsive power on the part of the ventricle and damming back of blood in the venous system, and the indications are to relieve the ventricles of work and increase the vigor of

their action, and at the same time to deplete the venous engorgement. Now, when the heart is weak, as it is here, it is much more important to relieve it of work than to try to lend it vigor. Without first diminishing the resistance in the circulation, to stimulate the heart to more energetic contraction may only cause it to give way and dilate further. Venesection, the most effectual means of relieving the right side of the heart, is very rarely applicable in dilatation; the initial fault being weakness of one or both ventricles, we cannot trust the heart to adjust itself to a rapid change of any kind, and the right ventricle may not be in a condition to take advantage of the relief afforded it. The application of six or eight leeches over the liver is safer, and it will usually effect all that can be done by direct abstraction of blood. The indication for this local bleeding is enlargement of the liver, and, when this is considerable, it rarely fails to afford striking relief. The hepatic region is selected for the application of the leeches because the pain and tenderness felt there are thus relieved; it is not supposed that blood is drawn from the liver, or that the same amount abstracted elsewhere would not be equally efficacious. The leeches will be followed by a hot poultice, which, besides encouraging the bleeding, will bring blood to the surface.

Concurrently with the application of leeches a purgative will be given, which will deplete the portal system at the same time with the systemic veins. Afterward this will be the principal means of keeping down the venous engorgement. It is not a matter of indifference what purgatives are employed. The object of a purgative is not simply to carry off as much fluid as possible, and so drain the tissues, as may be the case, perhaps, in ascites from cirrhosis of the liver, but to restore the balance of the circulation, when the kidneys will resume their function and remove the excess of liquid. The objects of treatment are: (1) to relieve the heart of work and (2) to increase its vigor. Of these, we can be much more sure of the first than of the second; we can more easily and certainly diminish the resistance in the arterioles and capillaries than we can lend strength and efficiency to the action of the heart, and, without removing the obstruction in the peripheral circulation, it might only do harm to excite the weakened heart to greater effort to overcome it. Now, mercurial purgatives have this effect of diminishing arterio-capillary resist-

ance and of lowering arterial tension, and, therefore, of relieving the heart. The hypothesis by which this observed fact is best explained is, that mercury influences the liver chemistry and promotes the elimination of impurities, which, when retained in the blood, give rise to resistance in the capillaries. Mercurial purgatives, then, have the double effect of depleting the portal system, which relieves the engorgement of the liver and the distension of the right side of the heart, and of diminishing the resistance in the peripheral circulation, and so relieving the left ventricle. The disadvantage that less fluid is carried off than by hydragogue cathartics is often compensated by increased flow of urine; and elaterium, gamboge, jalap-powder, and the like, when repeated, give rise to great exhaustion. Calomel, then, or blue pill, or gray powder should be given, in doses of from 1 to 5 grains (0.065 to 0.32 gramme), according to the urgency of the case, with colocynth and hyoscyamus, or rhubarb, followed by some mild saline. After one or more full doses at the outset, a moderate dose may be given every second or third night. The acid tartrate of potash will often co-operate beneficially, both by its action on the bowels and on the kidneys. The heart, being relieved of work, may be urged to more vigorous contraction by digitalis, strophanthus, sparteine, squills, caffeine, convallaria, apocynum,—the special heart-tonics,—with which strychnine may usually be combined with advantage. Strophanthus is a most valuable alternative when digitalis seems to produce sickness, or when it fails to exercise a favorable influence on the heart. Sulphate of sparteine has been of great service when digitalis and strophanthus appear to have exhausted their influence. Sometimes it does good to suspend all medicines for a few days and start afresh. It may be of the greatest service to drain away the fluid from the legs, even when the extent of the fluid is not such as to actually call for it. Even moderate ascitic or pleural effusions should be aspirated; a straw may turn the balance either way. Usually, however, it is prudent to give remedies a chance before resorting to paracentesis or puncture. As regards the method of drainage to be employed,—whether for œdema or ascites, but particularly for the latter,—Broadbent considers Southey's tubes much the best.

In regard to feeding, which is often a task of extreme difficulty, the object is to keep down the volume of the blood while

maintaining its quality. A small amount of solid or semi-solid food should be taken about every three hours. Stimulants are usually imperatively necessary, but should be kept within limits known and defined by the medical man. Cream-of-tartar drink may be taken to quench thirst between meals.

By treatment, we can not only arrest the increasing dilatation, but even reduce it. At the worst, much can be done to prevent the development of its ill effects. In the acute aggravation of dilatation the apex and extreme limit of dullness may be seen to return toward the normal position day by day. The amount of exercise to be taken will be a most important question, but no rule can be laid down for all cases. Whatever amount of walking can be done without breathlessness or exhaustion, and especially with enjoyment, will be safe and beneficial, and, provided due prudence is exercised, walking uphill need not be forbidden.

The exercise, however, should be regular and daily,—not spasmodic,—with intervals of inaction. It should not come immediately after food, and it is better taken early in the day than in the afternoon or evening. In some cases the treatment may have to be begun by actual rest in bed for two or three weeks, perhaps with massage, and the patient may have to resume exercise with just the same caution as food is resumed after hæmatemesis from gastric ulcer. In regard to the graduated walking uphill at considerable elevations, known as the Oertel's treatment, Broadbent doubts very much whether any good will be done in fatty degeneration of the heart; but some cases of early dilatation will be benefited, and an enormous number of imaginary cases of heart disease will be cured; a few patients will be killed.

*Fatty Degeneration.*—No form of heart disease is regarded with so much apprehension as fatty degeneration. More than any other, it carries with it the danger of sudden death and the liability to angina pectoris, and, although happily the disease is not very common, it would be most important to be able to make the diagnosis with certainty at an early period. The important point in its causation is, that the primary change is atrophy of the muscle-substance, and the fatty degeneration is secondary to this and consequent upon it. Disease of the coronary arteries being thus a cause of degeneration of the heart, the existence of conditions which may lead to the implication of the coronary arteries or their

orifices in morbid processes will warrant a suspicion that cardiac weakness, which may be recognized, is the result of degeneration. For example, an aortic murmur coming on after middle age may not indicate serious valvular lesion ; but, as it is probably the result of atheromatous changes in the valves or arterial walls in close proximity to the orifices of the coronary arteries, there is reason to apprehend that the disease may cause obstruction here, or may have extended to the vessels themselves, and progressive weakness of the heart, were this to supervene, would be attributable to degenerative changes in its walls. But there may be fatty degeneration of the heart when the coronary arteries are healthy. It is usually present, sometimes in a very advanced degree, in pernicious anæmia and granular degeneration, which is an acute form of the disease, is a constant effect of severe typhoid fever, and of fatal phosphoric poisoning. Cases occur in which a patient, convalescing from typhoid fever, died suddenly on sitting up in bed. It is not to be wondered at that in pernicious anæmia and fever the heart suffers more than the voluntary muscles, since these are at rest and there is no functional wear and tear ; whereas, in the heart, this is continuous and excessive. Diabetes, alcoholic excess,—tippling, rather than drunkenness,—a sedentary mode of life, may conduce to fatty degeneration of the heart, probably through deterioration of the blood, or it may be secondary to myocarditis. Cases are met with for which no explanation can be found, and we are compelled to assume that there may be a defective assimilative action in the muscle-cells of the heart, or, possibly, some unrecognized blood condition. There is very little that is characteristic in the symptoms. In a large proportion of the cases there has been no ailment which has led the patient to consult a medical man, when he is overtaken by sudden death during exertion or excitement, or the administration of chloroform, or after a full meal ; or the exertion or excitement may be passed through safely, and death follow some hours later, or even next day. Rupture of the heart is one mode of termination, and this may take place on very slight provocation. When the course of the disease has been sufficiently chronic to permit of the recognition of symptoms (which is chiefly when the degeneration is secondary to changes in the coronary arteries or to old-standing hypertrophy, with or without dilatation), they will be such as are produced by a slackening circulation, and

they are not so different from those attending dilatation as to permit of any distinction being drawn between the two conditions in an early stage without physical examination. In advanced stages characteristic differences appear. A noteworthy point is, that well-marked dropsy is rare, and probably never occurs in uncomplicated degeneration. The significance of this is, that the special effect of the disease is defective pressure in the venous system, and it is to this that the syncopal, apoplectic, and epileptiform attacks are due, which, together with angina pectoris, are the most characteristic later effects of fatty degeneration. The syncopal attacks vary greatly in intensity, and are marked rather by duration than intensity, and are not attended with complete loss of consciousness. They have usually been accompanied by prolonged coldness of the extremities and of the surface. There were no instances of sudden and complete loss of consciousness and immediate recovery, as in dilatation. These attacks are often premonitory of fatal syncope. There may be apoplectiform seizures and attacks resembling petit mal, attended with slow pulse, sometimes less than 20 in the minute. A greasy state of the skin, with a sallow pallor, has been described as characteristic of fatty degeneration, but nothing of the kind is present in a large majority of the cases. Many of the subjects retain the look of health for a long time, and even up to the moment when the heart ceases to beat.

*Pulse and Physical Signs of Fatty Degeneration.*—The most constant and significant feature of the pulse is that it is short and unsustained. The rate may be regular and about normal, or extremely irregular, both in force and time, and it may be frequent or slow. A very slow pulse, with extreme low tension, is most characteristic, but it is the most rare. The physical signs are largely negative. Unless degeneration has attacked a heart already enlarged, the size will be normal. If the fatty change is at all advanced, the impulse can neither be seen nor felt except, perhaps, as a faint vibration. The sounds are weak, and sometimes almost inaudible, but the intervals are usually normal. But a weak, short, unsustained pulse is common as a constitutional peculiarity, or may be simply a result of general debility. A distinction between functional weakness of this kind and weakness arising from organic disease can be made by having the patient walk briskly; if the heart is sound it rises to the occasion, the pulse-beat and

sounds are all more distinct, strong, and regular, whereas the fatty heart "goes to pieces," and the pulse becomes irregular and shorter than ever, or may even disappear. Until the disease is far advanced the diagnosis of fatty degeneration of the heart is not easy, and is scarcely to be made without more than one opportunity for examination.

*Prognosis of Fatty Degeneration.*—A fatal termination is merely a question of time and circumstance. A slight effort or a fall, a little hurry or excitement, too hearty a meal, an attack of flatulent indigestion or constipation, or a chill may hurry on fatal termination; and, on the other hand, judicious care may postpone it till the heart is completely worn out and comes to a standstill.

*Treatment of Fatty Degeneration.*—On this subject there is not much to be said. Life should be made as easy as possible for the sufferer. He should have as much sun and fresh air as the weather will permit, but on no account must he be exposed to severe cold. Such exercise as he is capable of is good for him, but he should never incur angina or extreme breathlessness. His food should be simple and his meals strictly regular, and the bowels should be kept well open.

#### MOMENTARY DILATATION OF THE HEART.

This condition, but little appreciated until recently, is described by G. Sée<sup>31</sup><sub>June 4</sub> as occurring under both physiological and pathological conditions. This temporary increase of the size of the heart cannot be explained as only apparent and ascribed to the action of respiration, for ordinary respiration does not sensibly modify the area of cardiac dullness, and, moreover, this increase of the size of the heart may occur four or five times in a minute, sometimes taking place during inspiration and sometimes during expiration. Nor can it be explained by variations in the distension of the stomach. The changes originate in the heart itself, and are due to a relaxation of the cardiac muscle followed by momentary dilatation. The pulse gives no indication of these cardiac variations. During auscultation, however, the first sound of the heart is found to become more feeble or almost inappreciable, and is sometimes replaced by a short soufflé. The change in the aortic second tone is still more marked. This feebleness of cardiac sounds has been demonstrated to occur synchronously with the dilatation.

The phenomenon may be explained by suddenly increased intra-cardiac pressure or by diminished tonicity of the ventricular wall. 1. Increased pressure may be caused by obstruction to the circulation in the heart itself or in the peripheral vessels. The increased pressure may persist, and the dilatation become permanent; or the pressure may vary, and dilatation may occur four or five times a minute and last from five to ten seconds. 2. Dilatation is produced by causes which diminish muscular tone. Physiologically, tonicity may vary with almost every contraction, under the influence of greater or less nervous stimulation, and this is the principal cause of momentary dilatation. This is shown by the action on the heart of drugs which influence the nervous system. Organic heart disease may be wrongly diagnosticated by mistaking temporary for permanent dilatation.

*Treatment.*—Sparteine is the most prompt and effective drug in diminishing the volume of the heart. It increases the tonicity of the cardiac muscle, as numerous observers agree. Digitaline equally diminishes the volume of the heart, but it acts principally on the cavities of the right side, and only in cases of pathological dilatation. Iodide of potash also diminishes the volume of the heart, but its effect is less pronounced than sparteine. Antipyrin and bromide of potash increase the volume of the heart and are contra-indicated. Caffeine has no action on the cardiac muscle.

#### ACUTE RHEUMATIC MYOCARDITIS.

This condition is thought by Peter<sup>3</sup><sub>Mar.14</sub> to have been insufficiently described and to be frequently overlooked, through the failure to test for deep-seated tenderness in the præcordial region. The patient complains of pain, which is increased on the slightest exertion. Pressure with the finger in the third, fourth, and fifth intercostal spaces increases the pain. On auscultation, a reduplication of the second sound is heard, but no souffle, unless endocarditis is present. The reduplication is caused by asynchronism in the contraction of the two ventricles.

*The prognosis* is much more favorable than in case of endocarditis, for complete recovery follows, except in cases that are immediately fatal. In the acute condition death may occur in syncope.

*Treatment* consists mostly in the application of blisters,

which are very effective. The pain caused by the blister acts reflexly, through the vasomotor nerves, upon the vessels of the myocardium. In endocarditis alone revulsion is almost useless, because the endocardium is not supplied with vessels and nerves. Stimulants may be necessary to combat a tendency to syncope.

Anatomically, the lesion consists, in the mildest cases, of a slightly granular condition of the muscular fibre and slight alteration of the striation. In a more advanced degree, granular degeneration is more marked, and is associated with multiplication of the nuclei of the muscle-fibres. Some fibres may appear swollen and hyaline. In a third condition,—the phase of atrophy,—the fibres become very thin or are broken down, and at the same time the connective tissue becomes more abundant. The latter is especially developed about the blood-vessels. The intima also becomes thickened; so much so, at times, as to obliterate the smaller vessels, and even considerable trunk. Hæmorrhagic infiltration follows in such cases. These changes cause the sensation of pain by their action on the sensitive nerves which are connected with the muscle-fibres. The myocarditis may involve the entire cardiac muscle, including the papillary muscles. In the latter case a mitral systolic souffle of functional character may be heard; this will disappear if the process ends in recovery.

#### CARDIAC SCLEROSIS.

*Diagnosis.*—Huchard and Weber<sup>3</sup><sub>AUG.5</sub> state that, contrary to the general opinion, the diagnosis of cardiac sclerosis is very easily made if the four following clinical laws are kept in mind: 1. Renal insufficiency is an early and constant symptom, although albuminuria may be absent. 2. In consequence of the degeneration of the myocardium, cardiac dilatation is always imminent. 3. The rhythm of the heart being a function of the cardiac muscle, and not of the nervous system, there is always a tendency to continuous or paroxysmal arrhythmia. 4. The disease assumes different forms, according to its location in the papillary muscles, the apex, or the ganglionic regions. It may terminate slowly by asystole, or rapidly by a sudden death.

#### TUMORS OF HEART.

Jürgens<sup>4</sup><sub>OCT.13</sub> publishes 4 cases of primary tumor of the heart. Case 1 is that of an infant, aged 10 months, in whose right auricle

was found a growth about the size of a cherry. It was situated between the superior vena cava and the insertion of the anterior flap of the tricuspid valve, and on microscopical examination proved to be a fibroma. No symptoms of heart disease were detected during life. Case 2 was that of a man aged 50, who, although free from heart symptoms during life, was found, post-mortem, to have a polypoid fibro-myxoma of the left auricle. The tumor was as large as a walnut, was attached to the middle of the anterior wall, and hung down an inch and a half into the mitral orifice. Microscopical examination showed the structure to be that of a highly vascular, pigmented fibro-myxoma, the pedicle containing some striated muscular fibres. Case 3 was that of a man aged 36, who died suddenly, and was found to have a fibro-sarcoma of the right auricle and tricuspid valve, which caused considerable stenosis of the tricuspid orifice. Case 4 was that of a woman aged 19, who also died suddenly, and whose heart was found to contain numerous small tumors buried in the wall of the right ventricle. Microscopical examination showed these to be gummata, infiltrating almost the whole of the right side of the heart. The endocardium, the septum, and especially the region of the tricuspid valves were also extensively infiltrated, the tricuspid orifice forming a rigid opening admitting only two fingers.

*Gumma of the Heart.*—Pitt,<sup>2</sup><sub>May</sub>, reports the case of a man aged 28, who fell down while at work, and died almost immediately. Until the time of his death he had been able to work hard without inconvenience. At the post-mortem examination a diffuse gummatous infiltration was found to involve the posterior parts of the septum and the papillary muscles of the mitral valve, which were much enlarged. A gummatous mass at the apex of the left ventricle had yielded and formed an aneurism, which had ruptured into the pericardium. There was another gumma on the surface of the right ventricle.

*Cysticerci of the Heart.*—Melnikoff-Razvedenkoff, of Moscow,<sup>2</sup><sub>Oct.3</sub> describes a case of cysticerci invading the human heart in enormous masses. A peasant aged 38 had fallen ill with "rheumatic fever," of an irregular type, accompanied with cough and purulent expectoration. Neither the heart nor the digestive organs had presented anything abnormal. At the post-mortem examination the whole external surface of the pericardium was found to

be studded with pale-looking cysts, varying in size from a pea to a bean, and containing a translucent, yellowish fluid. Seven other cysts were found on the inner surface of the right ventricle, 20 on that of the left, 5 on the mitral valve, and nearly 130 on the external surface of the organ and in the walls of the left ventricle. The dimensions of the heart were about normal. Numerous cysts were found in the other organs of the body.

#### ESSENTIAL TACHYCARDIA.

This condition is discussed by H. C. Wood,<sup>112</sup><sub>MAR.</sub> under the title of "cardiac nerve-storms." In the present state of physiological knowledge, it does not seem possible to form a definite, clear idea of the nature of a "nerve-storm," but this term suffices well, for the purpose of the clinicians, to designate a great, sudden disturbance of the nervous system, either sensory or motor, which comes and goes like a tempest in the large world about us. Clinically, cardiac nerve-storms may be divided into those which are sensory and those which are motor. In the first class pain is the chief manifestation, and in the second movement is the striking feature. Pain in the region of the heart is the inseparable companion of lesions of the heart itself. Angina pectoris is probably always the result of a more or less obscure organic disease of the heart itself. To the second class of cases, in which the disturbance is purely motor, the name tachycardia is applied, and it is proposed here to restrict this term to those cases in which very violent heart-action occurs without obvious reason. Most of these cases belong to one of three classes: (1) those in which there is paralysis of the pneumogastric or inhibitory nerve; (2) those in which the cardiac disturbances are reflex; (3) those in which the affection may be strictly considered to be a neurosis.

1. Paralysis of the pneumogastric nerve may be centric or peripheral. Doelger reported, in 1883, a case of apoplexy of the inhibitory centre in the medulla, in which the pulse rose to 168. More frequently the pneumogastric paralysis is peripheral, and is commonly due to pressure by cancerous or other tumors, and in diphtheria it seems to be proven that there may be a peripheral neuritis involving the pneumogastric nerve. 2. Irritation of a sensitive nerve is apt to cause slowing of the heart by stimulating the pneumogastric centre. Such cases of reflex tachycardia are

rare; but one is reported by Rommelaere, in which an extremely rapid cardiac action was attributed to the irritation of a biliary calculus. Three cases are also reported by Proebsting, in which a pulse of 200 to 250 was believed to be reflexly caused by irritation of the female sexual organs. 3. Violent heart-action, due to hysteria and allied conditions. Violent emotion may, without causing distinct hysteria, produce at once an excessive tachycardia, which is liable to recur afterward without obvious cause.

"*Essential Paroxysmal Tachycardia*" is defined by Wood as "a recurrent paroxysmal neurosis, in which attacks of excessively rapid heart-action occur without obvious immediate or predisposing cause, and without pronounced pain or excessive cardiac distress, the pulse rising to 160 or upward, the sounds of the heart remaining normal, and it being frequently possible to arrest the attacks by drinking a glass of cold water, and certain other procedures of apparently trifling import, the disease having apparently no tendency to shorten life or to develop organic disease, and being entirely compatible with great mental and physical activity."

In illustration, a case is reported at length, in which such attacks began in a vigorous man, aged 37, after he had received a sharp shock or jerk by stepping from a piazza to the ground, which was farther off than he thought. The attacks would begin very suddenly, and often lasted several hours. The pulse would rise to 160 or 200, and yet with so little general disturbance that he could write or walk about during the attacks. At times the paroxysms could be stopped by rapidly drinking a glassful of cold water or a cupful of hot coffee, or by producing vomiting, but after a while each of these measures would fail. In 1890, at the age of 87, he was still a vigorous man, but the attacks occurred almost daily. Between the attacks the pulse was 52, but during the earlier years it was about 70.

The nature of this curious affection is a difficult and interesting problem. The attacks may be considered to be of the nature of a nerve-storm; they produce extraordinarily little effect upon the heart, the vascular system, and the general organization, and are probably not associated with nor dependent upon any so-called organic lesion, but represent a functional neurosis. What is the mechanism through which the excessive heart-action is developed? It may be the outcome of pneumogastric paralysis, or of irritation

of the accelerator nerves. It is conceivable, but not proved, that changes in the nerve-apparatus of the heart itself may bring about an exceedingly rapid heart-action, since the original impulse of rhythmical movement occurs in the heart itself. The general consensus of professional opinion at present seems to be that the epileptic or motor paroxysm is due to a discharging lesion, and is not the outcome of a temporary palsy; so that analogy indicates that the tachycardia is due not to a paralysis of inhibition, but to a discharge of nerve-force. Further, the researches of Gaskell seem to prove that the pneumogastric nerve has trophic relations with the heart-muscle. This conclusion is also in accord with the discovery made by Eichhorst, and confirmed by von Anrep, that, in birds, section of both vagi is followed by rapid fatty degeneration of the heart. In view of these facts, the lack of distress, the absence of increased arterial pressure or general disturbance of the circulation, the failure to affect the nutrition of the heart, of the blood-vessels, or of the general system (which are so characteristic of essential paroxysmal tachycardia),—all seem to negative the idea that the paroxysms are the outcome of pneumogastric paralysis. Again, the slight influence which the affection has upon the heart or the general nutrition makes it at least improbable that the paroxysms are due to changes in the structure of the nerve-centres, or in the heart itself. The aggregated facts seem to strongly indicate that the tachycardiac paroxysm is caused by a discharging lesion affecting the centres of the accelerator nerve. In lectures published in 1879, François-Franck asserted that any great increase of the pulse, which, in the animal, is produced by stimulating the accelerator, is not accompanied by any increase of the arterial pressure nor by any augmentation of the work done by the heart, and that this is because the acceleration of the heart's action is primarily due to shortening of the diastole; and that, therefore, during the heart's systolic contraction, so little blood is expelled from the heart that the aggregate amount which passes through the ventricle during a minute is not increased. These conclusions are generally adopted by Foster and other physiologists, and if correct, as seems almost certain, the accelerators have no trophic relation to the heart, and it is evident why rapidity of the pulse, solely due to accelerator irritation, should produce little effect upon the heart and general system.

One of the most curious phenomena of tachycardia is the arrest of the paroxysms by the swallowing of cold water, which has been noted in all the elaborately reported cases. It affords a plausible argument against the probability of the rapid pulse being due to pneumogastric paralysis, since S. Meltzer has shown that swallowing is attended with a loss of tone in the vagi centre, and consequent weakening of cardiac inhibition and increased frequency of the cardiac beats. The arrest of the tachycardiac paroxysms by the swallowing of hot or cold liquids is due to stimulation of the inhibitory cardiac centre, produced by irritation of the peripheral-nerve filaments of the stomach.

Courtois-Suffit, of Paris, <sup>100</sup><sub>May 10</sub> has made a careful study of all the published cases of tachycardia, and gives a good clinical description of the disease. Essential paroxysmal tachycardia is a complex neurosis, characterized by three constant and principal symptoms: (1) enormous acceleration of the cardiac pulsations; (2) extreme diminution of arterial tension; (3) changes in the quantity and quality of the urine.

The attacks begin almost always suddenly, with vague prodromal symptoms, or with none at all. Vertigo and flashes of light are sometimes noted, and a feeling of violent constriction at the epigastrium. Some mental or physical shock may precede the crisis. Suddenly, the number of cardiac pulsations jumps up to 200 in a minute or more. The rhythm is regular, but of the "foetal" character; so that it is almost impossible to distinguish the first sound from the second. The sounds are distinct, but very short, and sometimes a light systolic souffle may be heard at the apex. The præcordial shock is replaced by a vibration of the chest-wall, which can often be seen to cover several intercostal spaces. The pulsations are powerful, and this phenomenon is in strong contrast to the second symptom of tachycardia,—the extreme diminution of arterial tension. This symptom has not been sufficiently emphasized, and is one of the essential diagnostic marks of this condition. The return of the pulse to the normal rate is the first sign of the cessation of the attack, and is often ushered in by two or three slow, forcible pulsations. In a great majority of cases, and always when the attack is of long duration, the secretion of urine is diminished, owing to the low arterial tension. Albumen is sometimes present, and, more rarely, temporary glycosuria, probably of bulbar origin.

The aspect is often characteristic. There is marked pallor, and sometimes cyanosis, but these disappear if the attack is prolonged. Often general venous stasis results from dilatation of the right side of the heart, and the cyanosis then becomes considerable. Central phenomena appear as the result of venous stasis in the brain: restlessness, insomnia, or distressing dreams, and sometimes even delirium. There may be pain in the left arm and a feeling of constriction of the neck, thorax, or abdomen. On the other hand, there may be no apparent discomfort, unless the attack is prolonged. Finally, the heart may become dilated, and the condition of asystole appears, attended with cough, hæmoptysis, dyspnoea, swelling of the liver, and anasarca. Contraction of the pupils has been noticed, or temporary dilatation, at the beginning of the attack. Often at the end of the attack, and especially when the termination is favorable, profuse perspiration occurs. If the attack is moderately prolonged there is an elevation of several degrees of temperature, without any apparent visceral inflammation. It is probably of nervous origin, and similar to that seen in hysteria or goitre. We have no means of foreseeing the probable duration of the malady or the possible return of the attacks. Whatever the cause, essential paroxysmal tachycardia is a grave affection. Of 11 cases reported by Bouveret only 1 was absolutely cured. The fatal termination occurs by syncope or the progress of asystole.

*Etiology.*—Of this little is known. The attacks begin between the ages of 20 and 40 years, and the sexes are equally affected. There is hardly ever any nervous heredity; no marks of hysteria or neurasthenia. It may possibly be a manifestation of epilepsy, as in a case reported by Talamon. Abuse of coffee and tobacco has been noted, and frequently some physical or mental excess. Often there is no appreciable cause.

Talamon<sup>31</sup><sub>Feb.12</sub> enumerates various conditions which have given rise to attacks of paroxysmal tachycardia. English authors, he says, are inclined to attribute this disorder to chronic articular rheumatism, and Duckworth has noted such a connection in several cases. In these cases, however, tachycardia is more often permanent than paroxysmal. Eales has reported a case in which paroxysmal tachycardia occurred in a patient with floating kidney. Onanism and excessive coitus may provoke the paroxysms. Klemperer has noticed cases among dyspeptics, both in those where

hydrochloric acid was in excess and in those where it was absent. The author, with others, has seen several cases of traumatic origin, such as a blow on the head or in the cardiac region. In some cases there have been valvular or myocardial lesions. Strahler has reported a case, in a young girl, where the paroxysms were due to compression of the right pneumogastric nerve by a lymphatic gland, and disappeared when the gland was removed.

The author divides these cases into two classes: those of peripheral and those of central origin. In the latter the paroxysms are associated with acute dilatation of the heart, and these cases often end in sudden death. Here there are, probably, alterations in the cardiac muscle. In the second class are found the cases properly called essential paroxysmal tachycardia, in which this symptom is the local manifestation of a general neurosis, epilepsy, hysteria, neurasthenia, etc. The tachycardia may then alternate with, or be replaced by, other manifestations of a similar nervous nature. To this variety belong the traumatic cases, the traumatism being related to the neurosis as the exciting cause. Talamon,<sup>3 Jan. 14</sup> reports a case of paroxysmal tachycardia, which he considers to be of an epileptic nature. A man, aged 53 years, fell a distance of eight metres, striking on his head. After suffering from violent delirium for six weeks, he became subject to paroxysms of tachycardia, which occurred three or four times a month. The attacks began suddenly, with the sensation of a blow in the præcordial region, vertigo, and a feeling of anxiety. The cardiac pulsations were too rapid to be counted. After lasting about half an hour, the attacks would suddenly cease, with a peculiar cerebral sensation. There was no loss of consciousness. In commenting on this case, Huchard was disinclined to admit an epileptic origin of tachycardia, pointing out that tachycardia was a disease of advanced age, while true epilepsy always began in young subjects.

*Pathology.*—According to Wood,<sup>112 Mar.</sup> very few autopsies have been made, and the results have been negative. Theoretically, the condition has been explained in three ways: excitation of the accelerator fibres of the sympathetic; transitory paralysis of the pneumogastric; affections of the intra-cardiac ganglia. The last hypothesis seems scarcely tenable, and we know almost nothing of the physiology or pathology of these ganglia. Many writers have thought that they could distinguish tachycardia produced by lesions

of the sympathetic from that produced by lesions of the pneumogastric, and Nothnagel gives the following facts: 1. In paralysis of the pneumogastric: acceleration very marked, cardiac impulse feeble, pauses equal, simultaneous paralysis of other fibres of the vagus. 2. In excitation of the accelerator nerves: strong cardiac impulse and well-filled peripheral arteries. To these signs we may add the effect of medication; if morphine calms the heart, it is a case of excitation; if the vagus is involved, small doses of digitalis soon bring the pulse to the normal. The author thinks that all the various symptoms, such as rapid cardiac action, low arterial pressure, fever, polyuria, albuminuria, glycosuria, pupillary symptoms, profuse perspiration, and occasional death by syncope, are much better explained by a lesion of the bulbar centre and the superior part of the medulla.

*Tachycardia at the Menopause.*—The subject of rapid pulse occurring at the climacteric has received very little attention hitherto. Kisch, of Marienbad, <sup>57</sup><sub>Mar. 1</sub> has had the unusual opportunity of studying 28 cases of this kind during the past five years. His clinical picture of the affection is as follows: At the time of the menopause, occasionally after the cessation of the menses, but most frequently between the ages of 40 and 50 years, when the menstrual flow is beginning to be irregular in time or in character, paroxysmal attacks of palpitation may occur in women whose heart's action has previously been quite normal. These attacks may occur without any exciting cause, or from some trifling disturbance. They come while the patient is walking, sitting, lying down, or even in sleep. They are attended with annoying sensations of oppression or anxiety, throbbing in the carotids and abdominal aorta, rushing of blood to the head, fugitive sensations of heat, and severe headache. Occasionally, there are noises in the ears, flashes of light before the eyes, dizziness, and, more rarely, syncope. Objectively, the heart's action is decidedly increased, and the pulse rises to 120 or 150, and sometimes still higher. In most cases it is full, strong, and regular. Redness of the face, neck, and chest is occasionally noticed. This may occur only in patches, coming and going suddenly, and is attended with a burning sensation. Free perspiration may occur on the head and back. The attacks may occur several times a day, or at intervals of several days, and last from a few minutes to a quarter

of an hour. With these cardiac disturbances there is usually a condition of bodily and mental restlessness, incapacity for continuous work, and uneasy sleep, disturbed by dreams. In these cases, contrary to the observations of Clément and Börner, there was no anæmia, but exactly the opposite. There was a tendency to plethora and corpulency, while the hæmoglobin test showed from 110 to 120 per cent., instead of 93 per cent., which is normal in women. The patients had a dread of apoplexy. The duration of the affection may vary from a few weeks to two years or longer. No evil consequences have been observed. In the way of treatment, very favorable results have been obtained from the systematic use of mild purgatives, suitable dietetic regimen, mountain-air, active bodily exercise, and cold, wet applications to the lower part of the abdomen. A course of several weeks at Marienbad is very effective. Small doses of bromide relieve the unpleasant nervous sensations. In the tachycardia of the menopause the author finds the direct etiological cause in hyperplasia of the ovarian stroma. This increase of connective tissue in certain predisposed individuals acts in some way, unknown as yet, upon the terminal nerves of the ovarian tissue, and through them, in a reflex manner, upon the sympathetic nerve—the accelerator of the heart. This explanation is supported by the fact that tachycardia is frequently seen after the operation for the removal of the ovaries, which is followed by a shrinking process of the internal genital organs.

*Treatment of Tachycardia.*—Huchard advises the following:

1. During the attack, physical and mental repose must be secured. The patient should be placed in bed, and lie on the right side as much as possible. The head should be low, because syncope is always to be feared. Czermak and Quincke think that the heart may be slowed by light compression of one or the other of the carotids. In one of Nothnagel's cases the paroxysm could be arrested by deep inspiration; a spray of chloride of methyl in the præcordial region or on the back of the neck sometimes succeeds. Digitalis may be effective or not.
2. During the interval between the attacks, abstinence from tea, coffee, liquor, and, above all, from tobacco. Disturbances of the alimentary canal must be avoided, as well as any physical or mental excess. In cases where the arterial tension is very low, quinine and ergot in pill form have given good results. Antipyrin has been employed by Huchard

without success, and veratrum viride has also failed. In several cases nothing has ended the paroxysms so quickly as an injection of morphine.

#### MISCELLANEOUS.

*Permanent Slow Pulse.*—In a paper on this subject, Bouchaud and Faïdherbe<sup>220</sup><sub>Jan. 30</sub> classify in three categories all the causes which are invoked to explain the production of permanent slow pulse: (1) cardiac alterations; (2) irritative lesions of the nervous centres; (3) vascular lesions of the bulb. Among cardiac lesions which have been found in cases of slow pulse are fatty degeneration of the myocardium, with or without atheroma, and stenosis of coronary arteries; fibrous degeneration, infarctions, and tumors. At the Medical Congress at Vienna, in 1890, von Ziemssen mentioned spherical or pediculated thrombi as also a cause of slow pulse. Charcot, especially, has emphasized the etiological importance of irritative lesions of the central nervous system. Cases are mentioned in which injuries to the spinal column in the cervical region, or blows on the head, have been followed by a pulse of 40 or even 20 beats in a minute. Injuries to the pneumogastric nerve produce the same effect, as is seen in cases of traumatism or compression by a tumor. Czermak could compress his own pneumogastric nerve and slow his heart at pleasure. The third theory is that of bulbar ischæmia, produced by arteriosclerosis, and is defended by Huchard and Grasseb. Two facts, apparently contradictory, have been proved by experiments. Landois has shown that compression of the superior vena cava, by producing venous hyperæmia of the medulla oblongata and brain, caused marked slowing of the pulse, and even arrest of the heart if maintained long enough. On the other hand, Duret has proved that bulbar anæmia, obtained by obliteration of an artery or by compression of the brain, diminished the rapidity of respiration and pulse. Consequently, every cause which tends, as does arteriosclerosis, to diminish the blood-supply of the bulb must slow the pulse. Aside from direct causes, age and the masculine sex predispose to slow pulse. In the great majority of cases the age is over 60 or 70 years. The greater number of cases finally end fatally. Slow pulse is only one symptom of the conditions which have been noted. It is associated generally with attacks of syncope or apoplecticiform or epilepticiform attacks.

In a discussion before the Hospital Medical Society of Paris, <sup>3</sup><sub>Feb. 11</sub> Comby and Dürr reported the case of a woman, 79 years old, whose pulse ranged from 32 to 36, and who suffered from attacks of vertigo and dyspnœa. The heart was hypertrophied, but there was no murmur. The urine was much diminished in amount, and contained only 4 or 5 grammes (1 to 1½ drachms) of urea in twenty-four hours. Subcutaneous injections of caffeine and a milk diet caused a great increase of the amount of urine and urea, while at the same time the vertigo and dyspnœa disappeared, although the pulse remained at 32. They argued from this that the vertigo and dyspnœa were caused by urinary intoxication, and not by changes in the bulbar circulation. Chantemesse supported this theory, and stated that in all the autopsies which he had made, in cases of slow pulse, lesions of the kidneys and atheroma of the arteries had been found, but there had been no trace of bulbar ischæmia or of lesions of the bulbar arteries. In reply, Huchard admitted that the result of autopsies was negative, but stated that bulbar ischæmia and lesions of that nature were incapable of being demonstrated by autopsy.

Moreover, Halberton, in the year 1841, in an autopsy in a case of slow pulse, found stenosis of the occipital artery and compression of the medulla oblongata, thus proving a bulbar origin of the malady. Slow pulse should be attributed, according to this author, to bulbar ischæmia, and the other accidents which very often accompany it (attacks of dyspnœa, angina pectoris, albuminuria, phenomena of urinary retention) are dependent on atheroma of the arteries, which, according to its localization, determines cardiac, renal, or uræmic symptoms. This distinction is important for therapeutic purposes. To combat bulbar ischæmia, he recommends 8 to 12 drops a day of a 1-per-cent. solution of nitro-glycerin; for syncope, nitrite of amyl, to dilate the cerebral vessels; for cardiac symptoms, alcohol, tea, coffee, and caffeine; for renal complications, milk diet is a specific. In some individuals slow pulse is a physiological condition, and is unattended by unpleasant symptoms. The prognosis is not bad, and the patients may live many years with a pulse of 40 or 50. Rendu mentioned a case in which the pulse was only 16 to 18 in a minute. There was no lesion of the heart, vessels, or kidneys, and the man seemed perfectly well.

*Arrest of the Heart in Cheyne-Stokes Respiration.*—Variations in the rapidity of the pulse during the phases of Cheyne-Stokes respiration have been noted by several writers, but never complete arrest of the heart, as in the following case, reported by Hallopeau and Petit.<sup>152</sup>  
Dec. 19, '90 The patient was a woman, aged 54, in the last stages of cancerous cachexia. There was a cancerous growth in the left breast, the abdomen, and probably in the left pleura also. Typical Cheyne-Stokes respiration finally appeared. The pulse showed the remarkable phenomenon of complete arrest during the respiratory phase. The cardiac pulsations ceased at the same time. At the beginning of the respiratory pause the pulsations began again, at first slowly; then, rapidly reaching the normal rate, they continued regularly during the entire period of the pause. At the moment when the respiratory movements began again the cardiac pulsations rapidly became slower, and then ceased entirely. Thus, the respiratory pause was succeeded by a circulatory pause, these two conditions alternating regularly. On several occasions the Cheyne-Stokes respiration was accompanied, in this case, by epileptiform phenomena. As the respirations became deeper, the head was thrown back, and, after a short period of tetanus, clonic convulsions supervened. The cessation of cardiac pulsations is explained by an excitation of the pneumogastric centre by venous blood, while, at the same time, the excitation of the respiratory centre stimulated the respiratory movements. When the excitation of these centres ceased, respiration was again arrested, and at the same time the cardiac pulsations were renewed. When the excitation extended likewise to the motor centres, an epileptiform attack occurred.

*Diagnostic Value of Venous Humming Murmurs in the Neck.*—Bewley, of Dublin,<sup>16</sup>  
May presents the result of his examination of 200 young people between the ages of 16 and 26 years. Of these, 51 were males and 149 females. All cases of disease, aside from simple anæmia, were excluded. The persons examined were divided into three classes: (1) *anæmic*,—those in whom the symptoms and signs of anæmia were well marked; (2) *slightly anæmic*,—those who felt perfectly well, but yet looked rather bloodless; (3) *not anæmic*. Of those examined, 22 belonged to the anæmic class, 31 to the slightly anæmic, and 147 to the non-anæmic. The results of the examination were as follow:—

	Murmurs.	Per Cent.
In the 22 anæmic there were . . . . .	19	= 86.4
“ 31 slightly anæmic, . . . . .	27	= 87.1
“ 147 not anæmic, . . . . .	85	= 57.9

In the non-anæmic class, 61.5 per cent. of the young women and 48.8 per cent. of the young men had murmurs. The conclusions which may be derived from these statistics are: 1. That murmurs are more common in anæmic conditions than where there are no suspicions of anæmia. 2. More than one-half of those persons who are not in the least anæmic have a venous hum in the neck. 3. From this, it is evident that the presence of a venous hum in the neck in any individual case is a matter of no diagnostic importance whatever. But if the mere presence of a murmur is of no significance, can any conclusions be drawn from the character of the murmur, especially from the loud, roaring murmurs? Of the very loud murmurs, 13.6 per cent. were found in the anæmic class, 16.1 in the slightly anæmic, and only 4.8 per cent. in the non-anæmic class. These loud murmurs, therefore, are much more common in anæmic states, but they are not peculiar to anæmia. The author's conclusions are the same as those of Apetz,<sup>20</sup> who examined over 600 individuals about three years ago.

*Diagnosis of Congenital Heart Disease in Children.*—Hochsinger<sup>26</sup> points out that, in the differential diagnosis between congenital and acquired heart disease, auscultation is of much greater value than percussion. Hypertrophy is often absent for years in cases of congenital heart disease, owing to defects, such as a patent foramen ovale in cases of pulmonary stenosis, which neutralize the tendency to hypertrophy. As regards auscultation, systolic murmurs during the first three years of life prove with certainty some organic anomaly, as accidental murmurs are unknown at this time. Again, in acquired disease, the murmurs have a certain sameness; they are soft-blowing murmurs in the neighborhood of the apex or over the ventricle. On the other hand, the murmur of congenital disease is loud, often musical, and heard all over the præcordial region.

Cases of congenital heart disease may be divided into two classes: (1) those with no murmur, as in displacements and malformations of vessels, and (2) those with murmurs, as in defects of the wall of the heart, patency of the arterial duct, or congenital changes in the valves or orifices. Congenital murmurs are most

often systolic. If the murmur is soft and limited in distribution, other symptoms must be looked for, and the most important is cyanosis. This is usually present in congenital disease, but is often absent during the first few weeks of life. Acquired disease, on the other hand, is so slight, as compared with congenital disease, that there is seldom such disturbance of compensation as to give rise to cyanosis.

Hochsinger lays down the four following rules: 1. Murmurs with cyanosis and a loud second sound point to a congenital change in one of the venous orifices. 2. Murmurs over the manubrium with cyanosis point to a persistent ductus arteriosus. 3. Clear heart-sounds with cyanosis and a loud second sound point to a transposition of the large vessels. 4. Murmurs (not arising from the orifice) with a loud second sound point to a defect in the septum and a transposition of the large vessels.

#### THERAPEUTICS.

*Treatment of the Senile Heart.*—This subject is fully discussed by Balfour,<sup>36</sup> June and the following is a brief summary of his paper:—

*Exercise.*—The need of exercise and the capacity for taking it safely and with advantage are often points to be very carefully considered. The effect of exercise is to promote the circulation through the muscles in action, and thus lower the intra-arterial blood-pressure; so that a weak, irregular heart, laboring against a high blood-pressure, often comes back from a walk of a mile or so perfectly regular, and pulsating with greater force and vigor. The exercise not only benefits the heart at the time, but, by promoting the circulation through its walls, it nourishes the muscle and accumulates energy within the ganglia. This, however, can only happen when the organism itself is not enfeebled and when the heart retains recuperative power, and is more oppressed than actually debilitated. The greater freedom of respiration and of circulation resulting from exercise must make metabolism more perfect, and thus influence favorably the urea-producing function of the liver, which constitutes it the great depurating gland of the body. Exercise, thus, not only lowers the blood-pressure at the time, but, by promoting the depuration of the blood, it helps to keep it down, provided the kidneys are healthy, and provided, also, that the appetite which exercise promotes is only moderately indulged.

*Diet.*—Excess in food, especially among the well-to-do classes, is a more serious menace to health and life than excess in drink, and it is especially so in respect of senile affections of the heart, some of which have been distinctly recognized to owe their origin to overindulgence, while all are undoubtedly aggravated by it. In health, the stomach empties itself, usually, three or four hours after a meal, and requires a rest before more food is taken. In those having weak hearts and feeble circulations the digestion is bound to be somewhat slower; hence, the first rule to lay down is,—not less than five hours between each meal. The next matter of importance to remember is, that the ingestion of solid food into a stomach still digesting a former meal arrests that process and provokes flatulence; hence, the second rule to be laid down is,—no solid food of any kind is to be taken between meals. This rule must be absolute; not even a morsel of cake or biscuit, or any similar trifle, is to be ingested between meals. The third important rule is, that all invalids should have their most important meal in the middle of the day, and should have only a light meal in the evening. All those with weak hearts have feeble digestions, from the gastric juice being deficient in quantity and defective in quality; it is needful, therefore, to restrict the quantity of their food, and to see that it is not diluted with too much water. But apart from this, and from the necessity of excluding all things known to disagree with the individual in question, as well as a few things likely to disturb any weak digestion, we may allow the patient a free hand in the selection and cookery of his food. Things absolutely forbidden are: all salted, dried, or preserved provisions, not excepting bacon, cheese; hot, buttered toast, carrots, and turnips.

*Alcohol*, in one or other of its various forms, is often recommended as an aid to a weak heart and to a feeble digestion, but it is so only temporarily, and always tends to enfeeble a weak heart and to lessen the power of a feeble digestion, when continued for any length of time, and ought to be given up. When old habits are too strong, only light claret or light and white hock should be taken with dinner. Whisky is preferable if there is the slightest tendency to gout.

*Narcotics.*—The abuse of narcotics is even worse than the abuse of alcohol, and it is impossible to treat, with any hope of

success, a dilated heart depending upon, or associated with, the abuse of opium in any form.

*Tobacco* is a powerful narcotic, not to be abused with impunity. The tobacco-heart is a well-known and easily recognized form of cardiac irregularity, for which there are many palliatives, but only one cure,—to give up tobacco. Cigarette-smoking and inhaling the smoke into the lungs is the most deadly mode of using the drug, and by far the most difficult habit to break. Other forms of tobacco-smoking—pipes and cigars—are very much alike, and their influence for evil depends upon the quantity smoked, and also, in a considerable degree, upon the quality of tobacco. With a weak, feeble, and irregular heart it is wise to give up tobacco altogether; though it is possible for many—not for all—to continue to smoke moderately to the end, if the smoking be restricted to a single pipe or cigar in the evening.

*The drugs* useful in the senile heart in all its forms are but few in number, but of extreme value. *Digitalis* is the chief and most thoroughly reliable cardiac tonic; where any drug can act at all it will never fail, and, carefully managed, there is no risk of any danger or discomfort in continuing it for as long as may be needful, though the danger of rupturing arteries which may be atheromatous, by the rise of blood-pressure due to the drug, is to be borne in mind. The writer believes this risk to be most infinitesimal. The tincture or Nativelle's granules of digitaline are preferred. The granules are said to consist chiefly, if not entirely, of digitoxin, a principle having an action precisely similar to digitaline. A weak or anæmic patient requires and tolerates a very much smaller dose than one more full-blooded. Ten minims (0.65 gramme) of the tincture, every twenty-four hours, or, at the most, every twelve hours, is sufficient; of the granules, 1 in twenty-four hours. The only rival of digitalis is *strophanthus*; but this is much more uncertain in its action. *Strychnine* is a most valuable remedy, especially when venous congestion and a tendency to catarrh exist, as is so constantly the case when the circulation is feeble. In a great many cases, even of well-marked senile irregularity, the continuous use of strychnine is sufficient of itself to promote a cure, while it is a powerful adjuvant to digitalis; and the combination of these two drugs often enables the most admirable results to be obtained, quite unat-

tainable by either separately. *Arsenic* is another remedy indispensable in the treatment of the senile heart; quite as much so as *digitalis*. It is an excellent tonic and stomachic; it is one of the best antineuralgics we possess, and has been found extremely useful in many cases of angina; it is said to increase the number of blood-corpuscles. It does all this often in the most minute doses;  $\frac{1}{100}$  grain (0.00065 gramme) of arsenious acid, once a day, is often the largest dose that can be tolerated. It may be combined with strychnine or *digitalis*. In cases where the blood is deficient in hæmoglobin *iron* is a positive necessity. It should be given with food, and never at the same time with *digitalis*, this combination being extremely apt to sicken. Next to strengthening the heart and improving the blood, lowering the blood-pressure is the most important object of treatment; indeed, we cannot, in many cases, do anything toward strengthening the heart till the obstacle to the freedom of its action is removed. For prompt and immediate relief to the pain of angina, or breathlessness due to vasomotor and bronchial spasm, that so often accompanies the senile heart, there are two drugs of supreme importance,—nitrite of amyl and nitro-glycerin,—the latter having the most persistent action, and being, therefore, preferable. The tablets containing  $\frac{1}{100}$  grain (0.00065 gramme) are the most convenient. One or two of these may be taken on any indication of pain or spasm, and the dose may be repeated several times a day if required. When the high intra-arterial blood-pressure is more persistent and more distinctly gouty in its character, the *iodide of potash* is to be preferred, as its action is more permanent. It does not require to be given in larger doses than 2 or 3 grains (0.13 to 0.19 gramme), every eight or twelve hours, but it ought to be persevered with for some time. It may be advantageously combined with *bicarbonate of potash* for high blood-pressure having a gouty origin. *Colchicum* is also useful in gouty cases. It is of the utmost importance to keep the *primæ viæ* free of acidity, and the bowels moving regularly by the use of *rhubarb* and *soda*. If a more active cholagogue or purge is required, we may use *calomel* or *blue pill*. Vichy water—a small tumblerful before breakfast, on first rising, and another about an hour before dinner—is useful. *Pepsin* is useful in dyspeptic conditions. A disease which has been gradually coming on for thirty or forty years cannot be expected to be remedied in a

week or two; it often takes many months of care before irregular hearts are made regular or the declension of a failing heart is arrested.

*Venesection in Cardiac and Arterial Disease.*—Pye-Smith <sup>2</sup><sub>Jan. 31</sub> reports the results of venesection in nearly 50 cases of various forms of disease, including bronchitis, broncho-pneumonia, croupous pneumonia, miliary tuberculosis of the lungs, thoracic aneurism, valvular disease of the heart, pericarditis, Bright's disease, apoplexy, and epilepsy. He considers the indications for venesection, in the order of their importance, to be: (1) cyanosis with dilatation of the right side of the heart, whether from pulmonary or from some other form of obstruction; (2) the intense pain of thoracic aneurism; (3) uræmic and prolonged epileptic convulsions. Reference was also made to bleeding in fevers and inflammatory disorders.

These conclusions are corroborated by Lafleur, of Johns Hopkins Hospital, <sup>764</sup><sub>Aug.</sub> who reports 5 cases of cardiac and arterial disease, in which venesection was done during the first two years after the opening of the hospital. The amount of blood withdrawn in each case varied from 14 to 16 ounces (480 grammes). Of the 5 cases, 3 ended fatally. In the first case—thoracic aneurism—venesection was done for urgent dyspnœa with cyanosis, and, although the patient was much relieved temporarily, he died of exhaustion two days later. The second case was one of chronic nephritis, with dilated heart and extreme cyanosis. The relief following venesection was immediate, the breathing becoming easier and the cyanosis almost disappearing, but the patient died the next day, probably from extensive hæmorrhagic infarctions in the lungs. In the third case—mitral regurgitation, with dilated and irregular heart—cyanosis and dyspnœa were markedly relieved, but death occurred from sudden syncope six days later. In the fourth case—arterial sclerosis, with cardiac hypertrophy and dilatation—there was venous engorgement, with slight cyanosis, stupor, and delirium, but the patient recovered after venesection, and returned to his work in two months. The fifth case was one of mitral regurgitation, with dilated and irregular heart, and extreme dyspnœa and cyanosis. Marked relief followed venesection, and the patient left the hospital three weeks later, after having been up and about for a week and feeling quite well. It is in these cases of primary cardiac and arterial disease that the most good may be expected from venesection.

Huchard<sup>2063</sup><sub>89</sub> advocates small bleedings, from time to time, in the first stages of arterial sclerosis, and thinks that in this way it may be possible to lessen, and even delay, the evils resulting from prolonged high vascular tension. He insists, particularly, on the value of venesection in the later stages of the same disease; when the left ventricle is no longer able to cope with the increased peripheral resistance and volume of blood and the heart is in danger of sudden arrest. This may occur even when there is but little œdema and cyanosis, though there is usually engorgement of the right side of the heart and veins. In addition to its purely mechanical effect, venesection removes from the blood a considerable amount of toxic material which has accumulated in it, owing to the imperfect performance of the functions of the kidneys and liver, these viscera being usually more or less affected by the general arterial sclerosis. The contra-indications to venesection in cardiac and arterial disease are few. Even when death is imminent, the rapid abstraction of some ounces of blood not infrequently saves the patient. It is obvious that, when marked ascites or pleural effusion co-exists with cyanosis and dyspnœa, the abdomen or the pleura should be tapped, and venesection delayed until it is apparent whether either procedure does or does not afford relief. Large hæmorrhagic infarctions of the lungs, or extensive disease of the myocardium or of the coronary arteries, could such conditions be definitely ascertained, would probably be a contra-indication, as even temporary relief could hardly be expected under such circumstances.

# DISEASES OF THE MOUTH, STOMACH, PANCREAS, AND LIVER.

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## DISEASES OF THE MOUTH.

*Stomatitis*.—E. Fraenkel<sup>57</sup><sub>Aug. 16</sub> has carefully investigated the various forms of stomatitis, known as the aphthæ of Bednar, aphthæ of the palate, or *plaques pterygoïdiennes*. He finds the patches to be classical instances of so-called mycotic epithelial necrosis induced by the invasion of bacteria into the superficial epithelial layer of the palate in the region of the pterygoid processes. The gradual detachment of the necrotic epithelium gives rise to ulceration, facilitating the entrance of other micro-organisms, with the possibility of mixed infections. While in most cases the affection is purely local, with not inconsiderable local manifestations, it may become general through the medium of the lymphatic system.

Diday<sup>136</sup><sub>June 15</sub> reports a case of communication of stomatitis from man to wife, the affection in the former having been of mercurial causation. He believes that certain of the numerous microbes inhabiting the mouth become virulent under the influence of the drug.

It is gratifying to find that more general recognition is at last being given to acute affections liable to be confounded with diphtheria. Sevestre<sup>3</sup><sub>July 1</sub> has observed in feeble and badly-nourished infants a form of diphtheroid stomatitis devoid of gravity, and eventuating in recovery in the course of about a week. It follows scarlatina and whooping-cough, but may occur independently. It is frequently associated with chronic coryza and with impetigo of the face. From ulcero-membranous stomatitis it is distinguished by the want of the characteristic fœtor, as well as by the location of the lesions, which appear not upon the free border of the gums and the intermaxillary region of the cheeks, but on the internal surface of the lips, and perhaps, also, at a few points on the

buccal mucous membrane. Impetiginous stomatitis is to be distinguished from diphtheria by its restricted localization, its entire lack of tendency to spread, and the impossibility of removing the patches without rupture of the membrane. Gaston and the author made numerous bacteriological examinations, and found constantly and almost exclusively the staphylococcus pyogenes aureus, the same organism being found in impetigo. Netter related a similar case in an adult, in which, however, the lesions more nearly resembled a pseudo-membranous angina, and referred to cases published by Fraenkel. Comby referred to cases published by himself. Later, Sevestre related <sup>3</sup><sub>July 8</sub> how he had rescued from the diphtheritic wards a child presenting the appearances he had described, the staphylococcus pyogenes aureus being present. The patient recovered, under applications of iodoform. A more striking illustration of the value of exact diagnosis in the diphtheroid affections could hardly be given.

Bax <sup>230</sup><sub>Jan.</sub> describes a case of pseudo-membranous stomatitis—its non-diphtheritic character being established by microscopic and bacteriological investigation—observed in a married woman, aged 48 years, who had been subject to recurrence of the condition for twenty-five years. It first appeared three weeks after a difficult parturition. Le Pileur <sup>479</sup><sub>Oct., '90</sub> calls attention to a chronic gingivitis occupying the free border of the gums, due to crowding of the molars dependent upon insufficient amplitude of the inferior maxillary curve, as constituting a barrier to the administration of mercury, and reports a case of toxic stomatitis, produced in a syphilitic patient of 22 years, presenting the condition described.

*Aphthous Stomatitis.*—Gillet <sup>35</sup><sub>Feb. 25</sub> believes that aphthous stomatitis is an indirect result of teething, being due to the action of microbes which find, in the excessive salivation and inflammatory phenomena, conditions favorable to their multiplication. Prophylactic treatment by antiseptic washes—such as boric acid, 3 grammes (46 grains); tincture of myrrh, 2 grammes (31 grains); water, 200 cubic centimetres (6½ ounces)—is the most important.

*Cancrum Oris.*—J. T. Graham <sup>9</sup><sub>Jan. 10</sub> reports a case of cancrum oris following typhoid fever, in a child of 8 years, from which recovery took place in about three weeks. The child is totally blind from purulent ophthalmia; her face disfigured, and her mouth closed by a fibrous adhesion between the cheek and lower

jaw on the right side. Alexander<sup>19</sup><sub>Mar.7</sub> reports a similar case occurring in a male aged 9 years. McDonald<sup>161</sup><sub>Mar.</sub> reports a case of cancrum oris following typho-malarial fever in a child of 4 years. Mercury had been given in the first days of the typhoid fever.

*Foot and Mouth Disease.*—Nesvizki<sup>586</sup><sub>No.15</sub> reports 8 cases of foot and mouth disease,—2 in children and 6 in adults. There was catarrhal inflammation of the mucous membrane of the mouth and a vesicular eruption on the soft palate, on the buccal mucous membrane, on the gums and lips, and on the edges of the tongue; but in no case on the posterior wall of the pharynx, on the tonsils, on the arches of the palate, or on the dorsum of the tongue. On opening the vesicles, a thick, yellowish liquid exuded. This was much thinner and of a lighter color in the case of recent vesicles. The vesicles dried up, leaving a small excoriation, which readily bled but soon healed, never going on to ulceration. In addition there was profuse secretion of saliva and an acrid coryza and odor from the mouth. In three of the children there was pain in the abdomen. One little boy had diarrhœa, the rest of the children being inclined to constipation. In the two adults there was no disturbance of the bowels. All the patients had rise of temperature, persisting until the eruption disappeared. In the case of which details are given, the evening temperature for the first five days was about 39.5° C. (103° F.), on the sixth it was 38.6° C. (101.5° F.), and after that it became normal. The duration of the affection was from eight to twelve days. In two of the children there occurred parotitis after the other symptoms had disappeared.

#### DISEASES OF THE TONGUE.

*Black Tongue.*—Hofheimer<sup>59</sup><sub>Dec.20,'90</sub> reports a case of nigrities, or “black tongue,” in a married woman aged 31. The symptoms were bad taste in the mouth accompanied by foul breath and a feeling of thickness and discomfort in the tongue. Examination revealed the characteristic hairy growth upon the dorsum and tongue. A strong solution of salicylic acid was given as a wash. This had the effect of causing a desquamation of about two-thirds of the discolored epithelium, which came away like a piece of diphtheritic membrane. A month later the trouble recurred. Salicylic acid was without effect. A solution of sodium salicylate and mercuric chloride with glycerin succeeded in entirely removing the

trouble. In four months there had been no recurrence. Another case is reported by R. Lake.<sup>2</sup><sub>Oct.31</sub> I exhibited to the Pathological Society of Philadelphia specimens from a third case (in addition to the two previously exhibited by me) of this affection, for which I would suggest the name of "hairy tongue."

*Macroglossia*.—Felsenthal<sup>158</sup><sub>B.14,H.1,2</sub> reported the case of a child, 20 months old, presenting macroglossia, in association with evidences of rachitis, defective mental development, and general muscular hypertrophy. He considers that the condition is a cretinoid manifestation, in conjunction with congenital rachitis and premature synostosis of the bones, entering into the formation of the foramen magnum.

*Erysipelas*.—Garel<sup>37</sup><sub>May; July 26</sub><sup>9</sup> reports the case of a laborer, 37 years old, who presented considerable swelling of the tongue, which began at the anterior half, at a point of ulceration, as a result of the presence of a carious tooth. The swelling was so great that the patient could not close the mouth, and there was profuse dribbling of saliva. In addition, there was a sense of debility, headache, and fever. In the course of a few days the pharynx and, in succession, the cheeks, the nares, the eyelids, the ears, and the scalp became involved. Although the presence of streptococci was not looked for, Garel maintains the correctness of the diagnosis of erysipelas.

*Glossitis*.—Two cases of acute parenchymatous glossitis are placed on record by R. W. Greene.<sup>19</sup><sub>Aug.29</sub> Joseph<sup>69</sup><sub>Apr.30</sub> employed, with satisfactory results, a 50-per-cent. solution of lactic acid in the topical treatment of a case of chronic superficial glossitis.

*Tuberculosis*.—Chartier<sup>479</sup><sub>July</sub> reported the case of a man 51 years old, in which, in the course of pulmonary tuberculosis, the larynx and then subsequently the tongue became involved. There was no history of syphilis. Pain in the mouth developed. There formed on the left side of the tongue a small superficial ulcer, about as large as a pea, oval in shape, with irregular surface, granular in appearance, and covered with a layer of yellowish mucus. Posteriorly to the ulcer was a small, yellowish-white prominence. Still further posteriorly was an ulcer, more extensive than the first, but presenting similar characters. The tongue was swollen, and red ulcers similar to those described were also visible upon the velum palati and on the left pillar of the fauces. Speech was difficult,

mastication impossible. The passage of liquids was painful. The patient was a singer, and played on a wind-instrument. It is believed that the constant and active movements of the tongue gave rise to ulceration or fissuration of the organ, and that in this way a mode of entrance was created for tubercle bacilli expectorated in the sputum.

*Lupus.*—Michelson<sup>4</sup><sub>Dec. 1, '90</sub> reported a case of lupus of the tongue in a woman 49 years old, the father of whom died of pleurisy and a sister of whom died of some pulmonary affection. The excrescences in the region of the follicles at the root of the tongue were removed by means of the cold-wire loop; then followed applications of oil of menthol (15 per cent.) and the occasional applications of the stick of nitrate of silver to the ulcerated portion of the mucous membrane of the pharynx; creasote was given internally. The condition of the patient improved. After treatment by means of tuberculin, the tongue became swollen, the existing nodules increased in size, and new ones formed in the region of the follicles at the root of the tongue, and more diffused infiltration on the left side followed. In a second case, in a man 39 years old, the father and a sister of whom died of some pulmonary affection, somewhat similar conditions to those in the case first reported were present. Creasote was administered from three to six times daily, and local applications of lactic acid (from 33 to 50 per cent.) were made, followed later by applications of oil of menthol (15 per cent.) and 4-per-cent. iodoform powders. The infiltration of the mucous membrane improved, and the ulcerations of the arytenoid cartilages evinced a tendency to cicatrize. Microscopic examination in both cases failed to demonstrate the presence of tubercle bacilli, but revealed the existence of characteristic giant-cells of lupus.

*Hemiatrophy.*—Birkett<sup>282</sup><sub>Mar.</sub> reports a case of hemiatrophy of the tongue with paralysis of the right half of the soft palate, diminished sensation of the mucous membrane of the buccal and nasal pharynx, paresis of abduction and adduction of the right vocal band, myosis of the right pupil, flushing of the right side of the face, hyperidrosis of the same side, and dryness of the throat,—the last three symptoms being produced upon pressure over a swelling situated close to the anterior border of the right sterno-mastoid muscle, at the level of a line drawn backward from the angle of the lower

jaw. This appeared during convalescence from mumps nine years previously. The skin was easily movable over it; there was a small, irregular, superficial cicatrix, the result of repeated cicatrizations. Birkett considers that the lesion has involved the hypoglossal, vagus spinal accessory, pharyngeal plexus, and superior.

Du Pasquier and Marie<sup>73</sup><sub>Feb.7</sub> have published an interesting *résumé* of the symptoms presented by the tongue in various nervous diseases, such as posterior sclerosis, bulbar paralysis, and other affections, which they consider under the headings of disturbances of sensation, motion, and nutrition.

#### DISEASES OF THE STOMACH.

*Microbicidal Properties of the Gastric Juice.*—Kianovski<sup>586</sup><sub>Nov.38,40,41</sub> states that the stomach of a healthy man, when empty of food, usually contains many microbes; that the quantity of bacteria in the stomach during the first hours of digestion is in direct relation with the quantity swallowed with food, drink, air, saliva, etc.; that the gastric juice, principally through its hydrochloric acid, possesses microbicidal properties; that microbes probably play no part in gastric digestion; that persons who secrete little hydrochloric acid may be readily infected by way of the stomach; that the stomach should not be allowed to remain empty too long in the morning; and that during epidemics of certain diseases, especially cholera, there should, if possible, always be some sterilized food in the stomach.

Van Puteren<sup>99</sup><sub>Aug.13</sub> reports the results of 127 experiments made upon 40 children, the ages ranging between 3 and 77 days. The proportion of bacteria in the stomach was found to be greatly increased whenever the tongue was coated or deposits existed in the mouth, these being conditions in which bacteria in the mouth were most abundant. The bacteria were much more numerous in infants fed on cows' milk than on those nursed at the breast. Of especial interest are the results which he obtained after the mouth had been thoroughly cleansed. In 18 per cent. of the experiments made, no bacteria were obtained from the stomach of breast-fed children. In 41 per cent. the proportion to the average number found in the stomach under other circumstances was as 1 to 130. In the cases in which bacteria were found to be absent from the stomach, the digestion was apparently perfect; hence

the writer reaches the conclusion that bacteria have no essential physiological function in the infantile stomach. This writer's experiments further show that the acidity of the stomach does not prevent bacterial growth. He made 8 experiments to determine the acidity, and found it only 0.6 to 0.8 per cent., while Miller had shown that 1.6-per-cent. acidity was necessary to inhibit bacterial growth.

*Solvent Power of the Gastric Juice.*—Voiry <sup>67</sup><sub>June 30</sub> has improved the method of preparation of the capsules containing potassium iodide, employed by Gunzberg to test the solvent power of the gastric juice. He makes a pill mass of the iodide, with some appropriate excipient, and divides it into little cylinders, each containing 20 centigrammes (3 grains). These are covered, after the fashion of rolling a cigarette, with delicate sheets of caoutchouc, 1 centimetre long by 2 centimetres broad. The extremities of the sheet are then stretched by an assistant and tied with a thread of fibrin at each end, and a third thread of fibrin is tied about the middle of the little packet. Being tested as to reliability, they are placed in glycerin and kept until needed. As soon as the fibrin is dissolved, the iodide is bound to be liberated, and the quantity of caoutchouc swallowed is inconsiderable.

Quintard <sup>17</sup><sub>Aug. 15</sub> suggests that, in testing the solvent power of the gastric juice, methylene blue be substituted for potassium iodide, and a capsule of gluten for the rubber capsule, with plug of fibrin. The capsule containing the coloring matter is swallowed after a breakfast, consisting of an egg, a piece of bread, and a small cup of coffee. Two hours later, and at succeeding intervals of fifteen minutes, the patient passes water, and notices the moment the urine begins to exhibit a green discoloration. Normally, this should be in about two and a half hours. In a dyspeptic, or in a case of simple gastric embarrassment, it may be delayed to five, six, seven, or eight hours.

*Gastrectasis and Megagastria.*—Chlapowski <sup>844</sup><sub>Apr. 25</sub> says that megagastria may be congenital or acquired, in youth or in old age, without occasioning any disturbances. Megagastria may lead to acute or chronic gastrectasis if a condition of weakness or of insufficiency of the musculature of the stomach be superadded. With gastrectasis are associated not only anatomic evidences of excessive distension, but also functional derangements of the stomach. As

long as the anatomical changes are functionally compensated for the condition is not one of gastrectasis. On the other hand, the mechanical insufficiency of a stomach of normal size may predispose to the development of gastrectasis. A common cause of insufficiency of the stomach, as also of gastrectasis, is gastroptosis, in consequence of descent of the large intestine. The diagnosis of gastroptosis depends upon a knowledge of the existence of enteroptosis.

*Method of Ascertaining the Quantity of Free HCl in the Gastric Juice.*—Jolles <sup>113</sup><sub>Dec. 21, '90</sub> has proposed the employment of eosin for the quantitative and qualitative analysis of free HCl in the gastric juice. The spectrum of a neutral solution of eosin contains two black lines in the bluish-green portion, which are intensified by alkaline solutions. If the solution of eosin contain a few milligrammes of free HCl the lines disappear, while several grammes of free lactic, butyric, acetic, and formic acid failed to cause the disappearance of the lines. Eosin may thus be advantageously employed for trituration of free HCl in the gastric juice.

*Dyspepsia.*—Coutaret <sup>211</sup><sub>Feb. 15, '22</sub> has made a careful study of digestive aberrations. Atony of the muscular layer of the digestive tube causes pathological stagnation, which is followed by dilatation of the stomach, the cæcum, the sigmoid, less frequently the transverse colon and duodenum. The condition is characterized by the absence of pain, by diminution of the production of hydrochloric acid, and by auto-intoxications. All dyspeptics are not atonic; neurosis of the pneumogastric or sympathetic may give rise to hyperkinesis of the muscular apparatus. This gives rise to painful dyspepsia, rarely complicated with dilatation, and characterized, as a rule, by hyperacidity of the gastric juice and spasmodic crises of varying kinds and degrees. Boulimia is the phenomena sometimes manifested. Treatment consists in energetic alkaline medication, with the use of sedatives, narcotics, chloroform, cocaine, condurango, cannabis, etc. There are also forms of dyspepsia due to general causes, such as diathesis and dyscrasias. *Anæmic dyspepsia* is best treated by iron given at the beginning of a meal and hydrochloric acid given at the end of a meal. *Neurotic dyspepsias* are of many kinds; when associated with hysteria, either hydrotherapy or the Weir Mitchell treatment should be instituted. *Rheumatoid dyspepsia*, which is not rheumatic, is manifested chiefly by gastric catarrh

associated with elastic hypertension of the arteries. There is diminution or absence of the hydrochloric acid of the gastric juice. Rheumatoid gastropathics will not yield to the French antidyspeptic *régime* or to Vichy water. They can only be cured by hygienic precautions, the use of sulpho-nitric acid, and certain mineral waters.

In addition to functional dyspepsias, there are digestive aberrations consequent on more or less grave anatomical lesions. Small epigastric hernias are relatively common and easily reduced by a proper bandage. Entasis, enteroptosis, and atrophy of the peptic glands are less readily managed. By "entasis" Coutaret designates the result of direct traumatism or prolonged muscular effort in the infra-diaphragmatic region. There is partial rupture or detachment of the peritoneum or of the attachments of the stomach, spleen, pancreas, or liver, with a circumscribed exudative peritonitis which may eventuate in recovery, or in an abscess which opens externally or into a viscus. Entasic dyspepsia is common, but not marked. Digestion is impaired slowly, and emaciation is usually insensible. The characteristic sign is impossibility of sustained physical exertion; but the patient is usually considered a malingerer.

After the first few days following the accident, the intense pain caused by exertion disappears, but muscular weakness may last many years. Recovery may be reached in from six to eighteen months, provided suppuration does not take place and the patient submits to the following rules: 1. All muscular effort, however moderate, is to be vigorously interdicted. 2. At the outset leeches are to be several times applied *loco dolenti*: afterward, repeated revulsive applications are to be made to the skin. 3. The constriction exerted from above downward is to be abolished, and a regular pressure from below upward maintained by a large bandage properly adjusted. 4. Dyspepsia is to be faithfully treated.

Edmond Weill<sup>211</sup><sub>Dec. 7, '90</sub> describes a form of grave dyspepsia, characterized by a continuous reflux of bile into the stomach, that he thinks deserves a distinct place in nosography. He relates a case and cites several more or less similar observations in literature. The cause of the deviation in the course of the bile is a change in the direction of the duodenum, which may be independent of grave organic lesion. Re-establishment of the normal relations of the

duodenum will suppress the biliary reflux. This may be accomplished by purely mechanical means. According to Cséri,<sup>84</sup> the best time for the employment of massage in the treatment of chronic dyspepsia is two or three hours after the principal meal of the day. The manipulation should at first be gentle; the pressure is gradually augmented until the stomach is actually kneaded, the movements being made from the cardiac extremity toward the pylorus. After the stomach has been manipulated, the small and large bowels should be similarly treated. Each *séance* should last about ten minutes. It is believed that by massage the passage of the food is hastened, and that the tonicity of the stomach and intestines is increased. According to Coutaret,<sup>67</sup> acid medication is indicated in cases of gastric catarrh dependent upon excessive secretion of mucus and duodenal juice. Strong acids are necessary in cases of marked digestive disorder associated with coryza, pruritus, and skin eruptions; also in cases in which there is an atonic and dilated condition of the stomach, permitting fermentative changes. Neurotic and anæmic girls, old men with enfeebled gastric powers, and the anæmic dwellers in tropical climates are especially benefited by the treatment indicated. Treatment by means of acids is contra-indicated in cases of hyperacidity (with excess of hydrochloric acid), pure dyspepsia, irritative dyspepsia, febrile or inflammatory affections, gout and rheumatism, and when a milk diet is taken. A useful formula consists of:—

R Acidi sulphurici (pur.), . . . . .	28 pts.
Acidi nitrici (pur.), . . . . .	8 pts.
Spts. rectific. (80 per cent.), . . . . .	180 pts.

Sig. : To be mixed gradually in ice.

This combination should be prepared long before it is required for use; in fact, the older it is, the better. The dose is about 20 drops, after meals, in water. J. P. C. Griffith<sup>19</sup> <sub>May 16</sub> advises, in the treatment of the chloro-anæmia, upon which gastric ulceration often depends, solution of albuminate of iron, as being less irritating than other chalybeates. I can indorse this advice from personal observations.

*Enteroptosis* has been described by Glenard. It is virtually a permanent prolapse of all or part of the intestine, which drags down in its descent the abdominal glands, vessels and nerves, and causes enlargement of suspensory ligaments. The ascending colon and

the right half of the transverse colon are most frequently affected, dragging with them the duodenum, liver, stomach, and right kidney. Neurasthenic symptoms accompany the condition.

*Atrophy of the peptic glands* is well recognized. It is a sclerotic process frequently due to alcoholism. As it progresses, secretion and digestion become absolutely lost. The simultaneous absence of hydrochloric acid, pepsin, and the milk-curdling ferment distinguish atrophy from cancer and grave dilatation. Partial sclerosis permits partial peptonization, which may be aided by acids and pepsin. Supplementary digestion in the intestines contributes in part to maintain nutrition.

*Gastric Ulcer.*—Saundby<sup>Feb. 14</sup> discriminated a case of gastrodynia from gastric ulcer by the history of other nervous affections; the age of the patient (15 years), which was less than that at which gastric ulcer usually occurs; the persistence and frequency of the vomiting, which followed everything, even water; while in gastric ulcer the stomach is rarely so irritable as to reject all food; the absence of hæmatemesis; the beneficial effect of a small blister, so often observed in nervous pain; the very rapid recovery of the patient, under appropriate treatment. The pain was strictly localized, showing that this sign must not be too strongly relied upon in the recognition of gastric ulcer. Referring to the difficulties sometimes encountered in the diagnosis of gastric ulcer, he alludes to 2 cases in which the pain was relieved by taking food. In 1 of these patients, a man aged 53, the location of the pain in the right hypochondrium led to an incorrect diagnosis of impacted gall-stone. Hæmatemesis did not occur till shortly before death.

Peter<sup>July 12</sup> contends that simple ulceration of the stomach is the result of gastritis, and is not a necrotic process due to vascular occlusion. In exhibiting the stomach of a man who had complained during life of intense pain in the epigastrium, with frequent vomiting, and in whom gastrectasia was the only demonstrable lesion, he called attention to the existence of a simple ulcer, of the diameter of a large pigeon's egg, which was not embolic in origin and had completely cicatrized; so that the patient, in a certain sense, "died cured." The cause of death had been the chronic gastritis, which persisted and impaired nutrition. Peter had pointed out that the intensity of the pain was too great to permit a diagnosis of cancer, notwithstanding the age of the patient.

Speaking of "pain in the stomach," he takes occasion to say that the translation of the name of the symptom into Greek—"gastralgia"—is not a diagnosis, and urges the most careful search for the cause of the pain. Peter also relates an observation of increase of epigastric surface temperature of from  $1^{\circ}$  to  $2^{\circ}$  C. ( $1.8^{\circ}$  to  $3.6^{\circ}$  F.) during the paroxysms, in a case of simple ulcer, in which painful crises, terminating in profuse hæmorrhage, frequently recurred. Hyperthermia and profuse hæmorrhage, he claims, are both impossible of explanation, on the theory of vascular occlusion, but readily accounted for the view of an inflammatory process. This matter is of therapeutic importance. In addition to other measures, revulsives should be applied over the epigastrium and frequently repeated.

Parisot<sup>184</sup><sub>Apr.1</sub> presented to the Medical Society of Nancy a stomach exhibiting globular deformation, as the result of the cicatrization of round ulcers. Goldenberg<sup>57</sup><sub>Feb.8</sub> has reported a case of round ulcer of the stomach, with perforation and the development of an encysted abscess of the peritoneal cavity. The head of the pancreas was as large as a fist, and contained a cavity filled with pus. Into this cavity opened several ducts having the diameter of a quill, containing pus, but not communicating with the pancreatic duct.

Fitz<sup>99</sup><sub>Dec.18,'90</sub> reports a case of perforating gastric ulcer, with circumscribed peritonitis, occurring in a strong woman aged 41 years, and not proving fatal until the fifteenth day, in which he believes that prompt operation would have saved life. Operation was proposed to the patient, but rejected. The diaphragm and the left lobe of the liver were found to be shut off from the rest of the peritoneal cavity by fibrinous adhesions. It contained some 2 pints of thin, opaque, yellow fluid and a considerable quantity of gas. The peritoneum inclosing this space was covered with a moderately firm fibrinous membrane. Elsewhere the peritoneum was normal, save for a few delicate adhesions between the omentum and the abdominal wall. The stomach was contracted and contained little fluid. Its anterior wall, near the smaller curvature, was adherent to the lower surface of the left lobe of the liver. A sharply-defined ulcer, not as large as the little finger-nail, with a minute perforation in its base, was found on the inner surface of the stomach, at the site of adhesion. Walther<sup>7</sup><sub>No.18</sub> reports 2 fatal

cases of perforating ulcer of the stomach, with peritonitis. In the first case,—that of a girl aged 18 years,—the symptoms pointed to perforating appendicitis, the pain being most intense in the right iliac fossa. Death was so imminent that operation was not attempted. The autopsy proved that section would have shown the location of the lesion; thus differing from a previous case of Walther's, in which laparotomy was done, but the lesion was not discovered until after death. In the other case the diagnosis was clear. Operation was undertaken on the fourth day of peritonitis, notwithstanding the low condition of the patient. Although relief was afforded from atrocious pain, coldness of the extremities gradually increased, and death occurred in the course of about ten hours. He believes that earlier operation would have had a chance for success.

C. Salter and W. S. Dickinson<sup>6</sup><sub>Mar.7</sub> report two cases of perforating ulcer of the stomach, with misleading physical signs. The peritonitis, which followed the perforation of the ulcers, did not pursue the more usual course, and spread throughout the peritoneal cavity, but remained more or less localized, though most intense and purulent. The first case presented the physical signs of pericarditis. At the necropsy no trace of pericarditis was found. Between the liver and the diaphragm was an abscess, pushing up the left leaflet some distance; and it is probable that this alteration of the usual relations, together with the pleurisy on the left upper surface of the diaphragm, gave rise to the friction, synchronous with the heart's action, which was mistaken for pericarditis. The second was one of perforation, with supposed pneumothorax. At the necropsy there was no pneumothorax. The lower lobe of the left lung was partially compressed by a small effusion of turbid fluid into the left pleura. An abscess-cavity, containing air and pus, was found between the diaphragm, the spleen, and the upper surface of the left lobe of the liver. Opening into this abscess was a small perforating ulcer, on the anterior wall of the stomach near the cardiac end. There was also a ragged abscess in the substance of the spleen, which communicated with that beneath the diaphragm. Gilroy<sup>2</sup><sub>Jan.24</sub> reports a case of sudden death from perforating ulcer of the stomach in a New Zealand farmer's daughter aged 17 years, who had been in apparent good health until thirty-nine hours previously. The first symptoms noted were

slight pain, nausea, and a tendency to vomit. The voided fluids were not excessive, and did not contain blood. The symptoms had abated some little time before the sudden death. J. Clark Stewart<sup>105</sup><sub>Apr.1</sub> presented to the Minnesota Academy of Medicine a specimen,—the stomach of a young Scandinavian girl, who had died of hæmorrhage from a gastric ulcer. The history was scanty; the girl had been strong and hearty. At the autopsy the spleen was found enlarged and indurated, with great thickening of the capsule; the vermiform appendix was congested; the stomach showed, near the cardiac extremity, a varix with an ulcer, three-sixteenths of an inch in diameter, leading directly into one of the vascular canals, the opening of which was stopped by a well-organized clot. Near this varix were other dilated vessels, containing clots, and an area of cicatricial tissue, perhaps an inch in diameter.

M. J. Weber<sup>19</sup><sub>Mar.7</sub> reports a case of fatal hæmorrhage due to gastric ulceration, in a woman aged 72, who had complained of nothing more than the ordinary symptoms of dyspepsia. He also describes a case of fatal peritonitis, occurring suddenly, from perforation of a gastric ulcer, in a farmer aged 69 years, who had had, for three years, symptoms of chronic gastritis, without much pain and with neither vomiting nor hæmorrhage.

Reddy<sup>282</sup><sub>Feb.</sub> exhibited a stomach in which a chronic ulcer, situated posteriorly on the lesser curvature, had perforated, occasioning fatal peritonitis. Albertoni<sup>276</sup><sub>Dec.20,'90</sub> reports a case of fatal acute peritonitis from perforating ulcer complicating an adenoma of the stomach. He suggests that such growths may exist without giving rise to sign or symptom until ulceration occurs. In young persons presenting symptoms of gastric ulcer without the usual causes, adenoma may be suspected, and is more probable, if tumor be discovered. Bratsano<sup>87</sup><sub>Aug.31</sub> reports a case of complete recovery in an alcoholic male 70 years old. Treatment consisted of the administration of perchloride of iron and tannin in mucilaginous solution. Whenever hæmatemesis occurred, morphine, sodium bicarbonate, and bismuth subnitrate were given, with a little quinia. In case of vomiting, absolute rest was enforced, with interdiction of hot foods and alcohol, and a strict milk diet was instituted. This was continued for a month, and nine months later the patient had resumed his libations without the renewed supervention of symptoms.

▪ Saundby <sup>6</sup><sub>Feb.14</sub> claims much success in the treatment of gastric ulcer. His usual plan is to give at first  $\frac{1}{2}$  ounce (15 grammes) of milk and lime-water every hour, and, when vomiting and pain cease, to double the allowance of milk, then change to soft bread-and-milk; then gradually, through egg-custard, pounded chicken, get to ordinary diet as soon as possible. The possibility of doing this is secured by treatment with a mixture of magnesium sulphate (1 drachm—3.89 grammes), iron sulphate (5 grains—0.32 gramme), and dilute sulphuric acid (10 minims—0.60 gramme) in peppermint-water (1 ounce—30 grammes), given three times a day. If hæmatemesis occur, or the patient is admitted with a history of recent hæmorrhage, ice is given to suck, and rectal feeding is resorted to for a day or two, and then the ordinary plan is instituted or renewed.

*Carcinoma*.—Pernice <sup>900</sup><sub>No.17,'90</sub> recorded the case of an old man who presented symptoms of carcinoma of the stomach. At the autopsy, however, the following conditions were found: Chronic ulcero-polypous gastritis, attributed to a primary chronic inflammation of the vessels of the mucous membrane and infiltration, with bacteria, of the mucous membrane; a mycotic, perforating ulcer due to suppurative destruction of the walls of the stomach; stenosis of the pylorus, caused by a large myoma, constituted of unstriated muscular fibres. Eisenlohr <sup>69</sup><sub>Dec.25,'90</sub> has reported a fatal case of carcinoma of the stomach, in which the gastric juice contained hydrochloric acid, with hyperacidity.

Johnson <sup>130</sup><sub>Dec., '90</sub> exhibited before the Medico-Chirurgical Society of Montreal a well-marked specimen of carcinoma of the stomach, and specimens of the liver, which was likewise infiltrated. The case had not been diagnosticated during life. The symptoms were loss of appetite and weakness, which had lasted for nine months. About four months before death the patient, who was a drunkard, began to complain of pain after eating. Vomiting ensued, and relieved the pain. There was no dilatation of the stomach. Toward the last the cachectic appearance became marked. When admitted to the hospital the most pronounced symptom was diarrhœa, for which he was treated with aromatic sulphuric acid and opium, which only relieved it for the time. The vomiting was entirely relieved by small doses of cocaine. At a meeting of the Medical Society of Hamburg, Lauenstein <sup>34</sup><sub>May 19</sub> pre-

sented the specimens from 4 patients in whom he had made artificial gastric fistulæ. In 2 the operation was performed on account of the existence of carcinoma of the cardiac extremity. Both died from exhaustion. In a third case there was stenosis of the pylorus from a cicatricial contraction. The patient committed suicide. In the fourth there was stenosis of the duodenum. Gastro-enterostomy was performed, but the communication of the stomach with the bowel was unwittingly made too low.

*Phthisis of the Stomach.*—J. P. C. Griffith<sup>19</sup><sub>May 16</sub> made the diagnosis of atrophy of the gastric mucous membrane in the case of a man aged 43, of a phthisical family, who, without marked emaciation, presented the lemon-tinted skin and blood phenomena (40 per cent. erythrocytes, 50 per cent. hæmoglobin) of pernicious anæmia, with symptoms of gastric distress and inability, and evident gastrectasia. The salol reaction was delayed. Free hydrochloric acid was not found in the gastric contents. The disease was of about two and one-half years' duration.

*Foreign Bodies in the Stomach.*—Ballinger<sup>34</sup><sub>June 2</sub> has reported the case of a girl, 16 years old, who, for two and one-half years, had presented symptoms of gastro-intestinal catarrh; the stools became liquid; ultimately, only liquid nourishment could be taken. A hard tumor was detected in the epigastrium. Death finally resulted from exhaustion. At the autopsy the stomach and duodenum were found distended by a great mass of hair. It was then learned that, as a child, the patient had been in the habit of pulling out hairs and drawing them through the mouth, though it was not known that she had swallowed any. The condition is analogous to one not uncommonly found in ruminants.

According to Kooyker,<sup>69</sup><sub>Aug. 27</sub> gastroliths are frequent in animals, but rare in man. He has reported the case of a man, 52 years old, who died from exhaustion. A positive diagnosis could not be made during life, though it seemed probable that a gastric neoplasm existed. At the post-mortem examination, a concretion, eighteen centimetres in length, weighing 885 grammes, was found, almost completely filling the cavity of the stomach. On microscopic examination the tumor was found to consist of vegetable matters, starch-granules, plant-tissues, cells, and vascular bundles containing chlorophyl; form-elements, of animal origin, particu-

larly hair, which has usually been found in gastroliths, were absent. Only 7 similar cases have been recorded in literature.

Edward Pisko<sup>150</sup><sub>Feb.</sub> has reported the case of a baby, 11½ months old, in which the employment of the potato cure was followed by the evacuation by the bowel of a steel screw that had been swallowed. For several days the infant was fed only on potatoes. Then a laxative was given, and the screw, imbedded in the intestinal contents, was easily and painlessly passed. J. Solis-Cohen<sup>9</sup><sub>Aug. 8</sub> reported a case in which an irregularly shaped dental clasper that had been swallowed was successfully passed after two days of "potato treatment."

*Dilatation of the Stomach.*—Dreschfeld<sup>90</sup><sub>May</sub> alludes to dilatation of the epigastric veins in both inguinal regions as a sign of dilatation of the stomach, to which attention had not previously been drawn. He has observed it in more than 60 cases. It increases with the causative lesion, and in marked cases it can be seen that the blood in these veins runs downward. He attributes the condition to compression of tributaries of the portal vein by the dilated and dragged-down stomach. It is often more marked on one side than on the other. Collier<sup>6</sup><sub>June 6</sub> reports 2 cases of fatal tetany following lavage, in the treatment of dilatation of the stomach. The first is that of a miller aged 36. Five hours after the operation the patient was seized with severe cramps in the arms and legs. The muscles of the limbs, the back, and the abdomen were rigidly contracted. There was stiffness but no rigidity of the jaws. The pulse became weak; cyanosis occurred. The rigidity passed off in three-quarters of an hour. Death occurred from gradual asthenia seven hours after the beginning of the attack.

The second case was that of a man aged 48, admitted for stricture of the pylorus with dilatation of the stomach. Soon after the lavage-tube was passed the patient became very faint, and it was withdrawn. Two hours later he complained of stiffness of the jaws and inability to open the mouth; rigidity of the arms, which were strongly pronated and flexed; and, finally, rigidity of all the muscles of the limbs and trunk. The temperature rose to 103° F. (39.5° C.). The patient became pulseless and livid, and died with a temperature of 107.2° F. (41.7° C.), about six hours and a half after the passage of the tube. At the

necropsy no injury to the mucous membrane was found, and, with the exception of the stomach, all the organs were healthy. Collier believes that the spasms were reflex, due to irritation of the mucous membrane of the stomach acting on a brain that had been rendered abnormally irritable by exhaustion consequent on vomiting and malnutrition.

#### GENERAL THERAPEUTICS OF THE STOMACH.

*Electrization.*—Einhorn<sup>41</sup><sub>Dec.18,'90</sub> has devised an electrode, constructed with a fine gold wire, covered with silk. The electrode is swallowed, and readily reaches the stomach. The metallic termination is covered with perforated rubber, to prevent direct contact with the stomach. After swallowing the electrode the patient swallows some water, which conducts the current to the walls of the stomach.

*Lavage.*—Liebmann<sup>99</sup><sub>Mar.5</sub> uses, to facilitate the introduction of the soft-rubber stomach-tube, a smooth stylet of rattan of the thickness of a No. 6 or 8 English catheter, about thirty-four inches in length, which projects one and a half or two inches at the proximal extremity. The distal extremity is curved like the beak of a metallic bougie. In using the tube, the stylet is withdrawn as soon as the entrance of the œsophagus has been reached.

*Oxygen.*—Landi<sup>900</sup><sub>Nos.1,2</sub> reports experimental and clinical results with oxygen in the treatment of gastric affections. The gas is introduced into the stomach after the method of Grocco. A tube having been passed, and sufficient water introduced to establish siphonage, the stomach-tube is connected, with the intervention of a hand-bellows, with a reservoir of oxygen, and the gas allowed to bubble slowly through the water. When a certain quantity—not more than 200 or 300 cubic centimetres (6½ to 10 ounces)—has been introduced, the patient is directed to expel it, which is easily accomplished with or without the aid of slight pressure on the abdominal wall. The introduction of the gas is then proceeded with, and the process repeated several times, just as in lavage of the stomach. The influence of oxygen on artificial digestion was studied with the aid of modern technique; and the author concludes that oxygen favors gastric digestion, and may be employed in the treatment of atonic dyspepsia. Clinical results confirm the opinions derived from experiment.

*Strontium Bromide*.—Germain Sée<sup>10</sup><sub>AUG. 27</sub> proposes, with acknowledgments to Laborde for the suggestion, the use of strontium bromide in various affections of the stomach. The salt is soluble in water in all proportions, and produces no ill effect locally, even in large doses. The minimum dose is 2 grammes (30 grains) and the maximum dose 4 grammes (1 drachm), to be taken in simple solution during the course of each of the three meals. It was administered to 32 dyspeptics; 18 cases of hyperacidity, with and without dilatation, with intense pain and considerable gaseous distension, were partly relieved or completely cured. The medicament prevented acid gaseous fermentation. Cases of nervous vomiting required the addition of cannabis Indica to complete the cure. Three other cases of painful digestion, with permanent tenderness of the stomach, were cured by strontium bromide, after strontium lactate had been used without result.

## DISEASES OF THE PANCREAS.

*Pancreatitis*.—Formad<sup>112</sup><sub>Oct</sub> reports the case of a spinster, aged 70 years, who died suddenly under circumstances casting upon her servant suspicion of having poisoned her. She had never employed a physician, and had always been in good health except for the preceding two years, when occasional spells of indigestion with vomiting after meals had been noted. Necropsy showed that death had resulted from subacute hæmorrhagic pancreatitis. Formad states that he has overlooked several cases like that reported which he had encountered in his autopsies previously to attention having been called to the matter by Fitz. The medico-legal aspect is important, as a misinterpretation of the lesions in similar cases might endanger innocent persons.

*Pancreatic Cyst*.—Zawadzki<sup>844</sup><sub>No. 6, Apr</sub><sup>90</sup> analyzed pancreatic juice obtained from a girl who had been operated upon for the removal of a pancreatic cyst. For fourteen days an abundant secretion appeared, first purulent, then watery. After four weeks the wound healed completely. The pancreatic juice for twenty-four hours was collected and analyzed. It was tenacious, yellowish, turbid, and had an alkaline reaction. The deposit contained large epithelial cells, mucous corpuscles, and fine granular detritus, but no crystals. In the ashes were found compounds of carbonic, sulphuric, phosphoric, and hydrochloric acids. The bases were

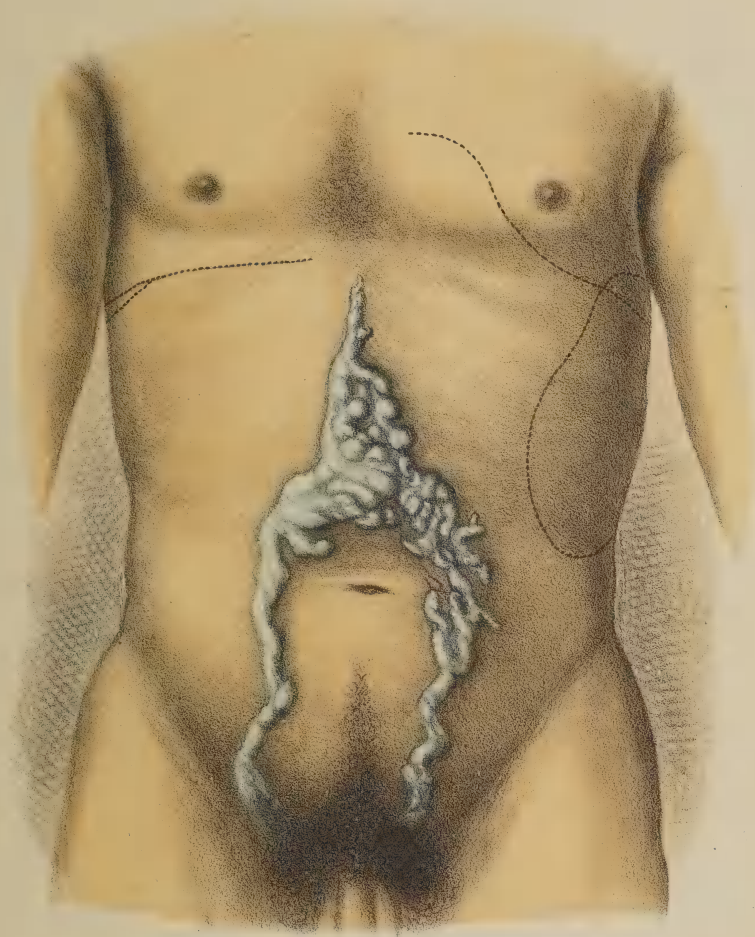
sodium, calcium, potassium, and iron. The juice contained coagulable albumen and hemialbumose, but no peptone.

Bücheler<sup>34</sup><sub>Mar.10</sub> has reported a case in which the head of the pancreas was replaced by a cyst the size of a small apple. Connected with this main tumor were several similar cysts, grouped around a solid cord, and extending to the left, close to the spleen, adherent to adjacent organs. The contents consisted of thin fluid, with an abundance of cylindrical epithelium. Microscopically, the walls were found to be composed of fibrillary connective tissue, in places containing epithelial ducts. The case was believed to be one of cystoma or cystoadenoma.

#### DISEASES OF THE LIVER.

*Cirrhosis.*—Segers<sup>3</sup><sub>Nov.4</sub> has studied cirrhosis of the liver as manifested among the Fuegians, and believes that poisoning by mussels is a frequent cause of the disease. He states that Fuegians eat from 5 to 10 kilogrammes (12 to 25 pounds) of these mollusks daily. Whether they are good or bad, hunger obliges them to eat them. Segers believes that the mussels are toxic only at a certain period of their development, and has made a number of experiments on animals which prove that the toxic effect is not due to microbes, but to some chemical product. The chronic mussel-poisoning is curable up to a certain point, when it is manifested only by enlargement of the liver. When it has arrived at its second period, that of atrophic cirrhosis, it is rapidly fatal.

Bouchard<sup>46</sup><sub>Oct.16</sub> records the further history of a case of alcoholic cirrhosis, reported by him in 1889, in which there were present enlargement of the liver, dilatation of the subcutaneous abdominal veins, and ascites (necessitating four punctures in the course of a year), and in which a cure was effected by the use of calomel in small doses. There was noticed a splenic souffle synchronous with the pulse, but this had disappeared two years later. With the disappearance of the souffle other vascular troubles appeared. Small, erectile, venous tumors appeared on the face, in the pharynx, and on the internal surface of the last phalanx of the ring finger of the left hand. The digital tumor, in February, 1890, became the source of a quite active hæmorrhage, apparently arterial, which was easily controlled by compression. In the following August the same tumor became the seat of new series of hæmorrhages,



Hypertrophic Cirrhosis of Liver. (Schapiro.)  
St. Petersburg Med. Wochenschrift.



also treated by compression, which provoked necrosis of the last two phalanges. Other varices existed in the œsophagus. The one gave rise to hæmatemesis and to melæna, and finally to a severe hæmorrhage, to which the patient succumbed. At the autopsy the entire alimentary canal, from the cardiac to the anus, was found distended with a mass of blood estimated at 6 litres (6 quarts). At the same time that the varicose tumors appeared, another symptom was noticed. The hands placed upon the anterior surface of the two knees perceived a beating synchronous with the pulse, apparently having its seat in the subcutaneous tissue. Over the patella there was no alteration of size, shape, or color. The same phenomenon was observed above other bones. Capillary pulsation was demonstrated in the nails. There was marked stenosis of the aorta, with hypertrophy of the heart and hepatic cirrhosis, the vascular changes being attributed to the condition of the liver.

Schapiro <sup>21</sup><sub>July 13</sub> has reported a case of hypertrophic cirrhosis of the liver in a man 33 years old, without a history of syphilis or of malaria. The upper part of the abdomen and the lower part of the thorax were protuberant; the abdominal veins dilated; ascitic fluid reached almost to the level of the umbilicus. On palpation the liver appeared firm; its margin extended in the median line almost to the umbilicus, and in the mammary line projected a hand's breadth below the margin of the ribs. Pressure on the liver gave rise to pain only at the xyphoid cartilage. The area of hepatic percussion-dullness extended above in the parasternal line to the fourth rib, in the axillary line to the sixth, posteriorly two fingers' breadth above the angle of the scapula. Later, the liver decreased in size and a plexus of varicose veins as large as a man's fist appeared at the umbilicus; from this plexus emanated veins as thick as a thumb, surrounding the umbilicus and running downward; one vein ran upward and disappeared in front of the xyphoid process. Schapiro does not consider the prognosis of cirrhosis of the liver as absolutely unfavorable. A milk diet should be observed and calomel should be administered; warm baths should be taken and hot affusions applied to the abdomen. Massage may prove serviceable in establishing the collateral circulation.

*Acute Yellow Atrophy.*—A number of cases are reported. Burekhardt <sup>214</sup><sub>Aug. 14</sub> reports a case from the practice of Immermann. The onset of the symptoms dated from a visit of the patient to the

scene of a railroad accident, and the author concludes that "psychic trauma" had much to do with the development of the disease. Metcalf<sup>185</sup><sub>Aug.</sub> reports a case, which he considers to have been acute yellow atrophy, occurring in a woman 22 years of age, five months advanced in first pregnancy. The symptoms began suddenly with dizziness and nausea, violent headache and chill, with temperature of 105° F. (40.6° C.). Next day abdominal pains set in, and in a few minutes the foetus was expelled. The day following jaundice appeared, fever increased, and cutaneous ecchymoses developed. Fever and jaundice continued. Increased nervous symptoms became marked; delirium, followed by coma, closed the case on the seventh day. Necropsy was not obtained. Sainesbury<sup>6</sup><sub>Mar. 28</sub> reports the case of a widow aged 34 years. At the necropsy the peritoneal sac contained considerable fluid. The liver was small and lay against the spine, separated by a considerable interval from the chest-wall.

The author lays stress upon the occurrence of ascites, which is not usually mentioned as a complication of acute yellow atrophy, and therefore raised doubt as to the correctness of the diagnosis. The enlargement of the liver on admission was undoubted. Bile was absent from the stools except in one or two instances. Albumen appeared in the urine during the progress of the case and then disappeared. Shortly after the patient's admission there was some coffee-ground vomiting, but the hæmorrhagic tendency did not become marked until the last three days. The swelling of the hands and feet and of the face the author is unable to account for. Lafitte<sup>7</sup><sub>No. 16</sub> reports a case complicated with multiple cerebral hæmorrhages in a domestic aged 19 years, admitted into the hospital in a state of coma. But a week before she had complained of headache and nausea, and two days later she was found in bed, unconscious and pallid. She never recovered consciousness. At the autopsy multiple cerebral hæmorrhages were found. The liver weighed 950 grammes (29½ ounces). It was soft, retained the impression of the finger, and gave an oily sensation to it. The right lung was in a state of atelectasis; in the left lung the atelectasis was less pronounced. There were numerous subspinal ecchymoses. The only lesion detected microscopically in the liver was pigmentary infiltration of scattered lobules, principally perilobular. The author believes that we must either admit the

occurrence of cerebral hæmorrhage secondary to acute yellow atrophy, or attribute both lesions to the common action of an unknown infectious agent. M. F. Allen<sup>102</sup><sub>Jan. 23</sub> reports 3 cases, and summarizes the literature of the subject. Another case is reported by John Lindsay Steven.<sup>213</sup><sub>June</sub>

*Icterus*.—Mya,<sup>589</sup><sub>Oct. 23</sub> at the Congress of the Italian Society of Internal Medicine, expressed the opinions that jaundice, following greater or less destruction of the blood-cells under the influence of infectious or toxic agents, is the consequence of concentration of the bile and augmentation of its usual chromatic constituents; that this accumulation takes place principally in the very fine biliary ducts; that in man and the superior vertebrates the excess of bile-pigment secreted under these conditions is probably the product of the activity of the hepatic cells, which elaborate it from the blood-pigment borne to them under the form of detritus, or under the form of hæmoglobin dissolved in bilirubin. The presence of bile-pigments in the serum of the blood or lymphatics is not, however, necessarily followed by icterus, because the pigments may also be transformed—that is, up to a certain limit—into substances more diffusible and less chromatic, of which the most important in human pathology is urobilin. But whenever the quantity of bile-pigment circulating in the blood passes the limit, that pigment cannot be entirely transformed into diffusible substances, and then icterus supervenes. The pathological phenomena of the absorption of bile-pigments may thus present a series of gradations from simple urobilinuria to most intense icterus. Icterus resulting from dissolution of the blood, as observed in man, generally presents a less degree of intensity than icterus with urobilinuria; but this fact cannot be brought in definite relation with an alteration of the hepatic parenchyma which frequently accompanies that form of icterus, nor with a less excessive amount of the pigment of the blood carried to the liver under these conditions.

Mester<sup>69</sup><sub>Nov. 27, '90</sub> gives, as the causes of icterus gravis: (1) mechanical occlusion of the lumen of the cystic and common ducts by calculi, hepatic growths, enlarged head of the pancreas, carcinoma of the duodenum, tumors of the transverse colon, etc.; (2) acute yellow atrophy; (3) terminal stage of atrophic cirrhosis. He described 5 cases in which the clinical manifestations were obscure, calculi being suspected. Autopsy showed (1) carcinoma of the

duodenum, involving the entrance of the common duct with small metastases in the great omentum, vesico-rectal pouch, pancreas, liver; (2) carcinoma of the duodenum, involving the papilla, with one small metastatic nodule in the liver; (3) chronic indurative pancreatitis, with pressure on the papilla; (4) cicatrix of an old duodenal ulceration in Vater's diverticulum; (5) hobnail cirrhosis with extensive fibrous hyperplasia in the neighborhood of the branches of the portal vein, the acini remaining very largely intact. Patella<sup>589</sup><sub>Oct.23</sub> does not admit the existence of hæmatogenic icterus, but insists that all the forms of icterus observed clinically belong to the group of absorption jaundice. He considers that our knowledge is insufficient to draw any conclusions regarding the mechanism of the production of the symptoms, and would place Weil's disease in a separate group, due to toxic causation. McHardy<sup>2</sup><sub>Oct.31</sub> reports the case of a strong, well-nourished boy, who, five weeks after birth, was observed to be jaundiced over the upper half of the body. The discoloration descended to the umbilicus, where it ended abruptly, being sharply defined by a well-marked line encircling the body. Below this line, the pink, healthy hue of the skin stood out in contradistinction from the intense yellow of the parts above. By the fourth week of treatment recovery was complete, and during this time there was no disturbance of the general health.

Jaeger,<sup>133</sup><sub>Sept.30</sub> in a fatal case of infectious febrile jaundice, found fatty infiltration of the liver, parenchymatous nephritis, slight injection of the mucous membrane of the small intestine, and numerous hæmorrhages in the mesentery and kidneys. In the tissues of the various organs fairly thick and mostly curved bacilli were found. These were especially numerous in the kidneys; the cultures from liver, spleen, kidneys, and medulla oblongata uniformly developed an organism that changed its form in the progress of development. The type was a short, thick bacillus, usually curved, frequently arrayed in pairs. The bacilli were active; they moved by means of flagella attached laterally. In gelatin cultures the bacilli at first gave rise to the presence of clear, watery drops; then a delicate coating formed, the periphery of which was marked by fine curved lines; centrally the gelatin was liquefied. In the case of many colonies, liquefaction did not take place. This contrast of liquefying and non-liquefying colonies in

the same culture is quite characteristic. The conclusion is that the bacterium is a variety of proteus. Inoculation experiments on the lower animals were successful. Jaeger attributed infectious febrile jaundice to bathing in polluted water. An analogous affection has been observed in poultry, in which a variety of proteus has also been found. The same organism has also been found in polluted water.

Raymond<sup>202</sup><sub>Oct.10</sub> called attention to the relation of certain affections of the liver to microbic infections, and reported 2 cases of jaundice ending in death. The liver weighed 19.50 grammes (4 pounds). Raymond believes that the microbes ascended the common bile-duct from the intestines, by reason of the biliary stasis following obstruction of the bile-duct by a calculus; that the existence of gall-stone warrants, to a certain extent, the hypothesis of an old infection of the bile-passages that, at the time, passed unnoticed. He lays much stress on the importance of a study of the variation of the curves of the urea in diseases of the bile-passages. When this curve keeps at the normal level, or above, integrity of function of the hepatic cells is indicated; when the urea excretion falls below the normal the icterus is aggravated, and death is not far distant.

Landau<sup>69</sup><sub>Jan.4</sub> has reported the case of a strong boy, 16 years old, in whom jaundice developed in the course of the treatment of an incised wound of the hand, in which irrigation with a 3-per-cent. solution of carbolic acid was practiced.

*Abscess of the Liver.*—Boinet<sup>3</sup><sub>Sept.23</sub> has studied abscess of the liver as manifested in Tonkin. The diagnosis is extremely difficult at the beginning. When abscess of the liver is suspected, he advises deep puncture with a trocar three millimetres in diameter. If pus is found, the needle serves as a guide for directing incision into the pocket. Peritoneal adhesions are very frequent, and he has seen penetration of pus of an abscess into the peritoneal cavity. After antiseptic irrigation the dressing is completed by an elastic band, designed to exercise a slight compression, favoring the retraction of the wall of the abscess. At necropsies he has, indeed, seen cases of voluminous abscess-cavities lined with a deep body of cicatricial fibrous tissue. He believes that it would be justifiable to immobilize the anterior wall by a costal resection, facilitating the collapse and adhesion of the walls of the

abscess. In 78 operations he has had 60 recoveries. Among interesting cases was one in which an abscess of the left lobe opening into the epigastrium was treated by a single direct incision. In another case the abscess opened into the colon without giving rise to any prominence externally, although the purulent pocket extended into the neighborhood of the epigastrium. In another case the abscess had opened into the pleural cavity, communicated with the bronchi, and had burrowed into the subcutaneous tissue in two places.

Joseph Gabriel<sup>6</sup><sub>May 22</sub> reports a case of abscess of the liver in a man aged 32 years, a native of Hayoum, in Upper Egypt, who had apparently recovered from an attack of acute hepatitis and enjoyed good health during two months, at the end of which he was suddenly attacked by dyspnœa and a severe cough. He expectorated a chocolate-colored material, composed of pus-cells and broken-down liver-tissue. At the time of report he had expectorated about 400 ounces ( $12\frac{1}{2}$  litres), but still had strength to go about and fulfill his ordinary duties.

Carter<sup>187</sup><sub>July</sub> exhibited a case of abscess of the liver, apparently secondary to dysenteric ulceration, which last, however, had given no symptom during life. The order of pathological events seems to have been (a) dysentery; (b) hepatic abscess; (c) rupture of the abscess into the right pleural cavity, with empyema; while the order of symptoms seems to have been the exact reverse of this, the patient having been admitted for pain in the lower part of the right chest, with hectic fever, leading to aspiration of the pleural sac before the disease of the liver was recognized.

Hatherly<sup>26</sup><sub>July</sub> states that "the diagnostic value of chyle in the urine in hepatic affections is the subject of a pamphlet by Buisseret, whose conclusions are as follow: The testing of urine as regards chyle has hitherto been neglected in cases of hepatic abscess, and it should be resorted to whenever this disease is suspected. It is rare for chyle to exist in the prolonged suppuration of phthisis. In such cases, the presence of fatty granules in the urine is more probably due to secondary renal changes. Chyle is met with not only in the hæmato-parasitic diseases that affect the renal and urinary tracts when disordered circulation affects the lymphatics (by fatty embolism or fistula) and in diseases of the pancreas, but also in abscess of the liver. In these latter cases it

cannot be overlooked that the diseased organs have a common function; they contribute to the digestion and absorption of fatty matter. Besides, their anatomical proximity leads one to think they may, by increased morbid growth, compress each other and lessen functional activity. It is therefore difficult to decide to which gland the disease must be assigned; an early examination of the urine, showing whether or not bile is present, may be advantageous."

Joseph Levi, our corresponding editor in Colon, United States of Colombia, <sup>673</sup><sub>July</sub> states that in his cases of abscess of the liver a history of syphilis was always obtained.

*Biliary Fistula.*—E. Potherat <sup>7</sup><sub>No. 9</sub> describes a biliary fistula, discovered during the examination of the body of a woman aged between 25 and 30 years. In the left flank there was an aperture in the midst of a mass of cicatricial tissue. A probe passed into the orifice went in the direction of the hilum of the liver. Dissection showed that the course of the biliary fistula was as follows: Beginning at the hilum of the liver, it ran between the layers of the lesser omentum, passed along the posterior surface of the stomach, then in front of the left kidney, behind the descending colon, to open into an abscess-cavity which discharged externally. This abscess of the abdominal wall seemed to have opened spontaneously and to have been of long standing, as was shown by the extensive formation of cicatricial tissue. The liver was normal in appearance, but there was marked jaundice of the skin, especially that of the face. General peritonitis had glued together the small intestine. The clinical history was not known.

A. W. Mayo-Robson <sup>2095</sup><sub>V. 47</sub> has made extensive observations upon the biliary secretion in a patient with obstruction of the common bile-duct, in whom an artificial biliary fistula between the gall-bladder and external surface had been produced, through which the whole of the bile was discharged for fifteen months. During this time the digestion was unimpaired, bowels regular, the fæces of normal odor. Menstruation ceased while the fistula was patent, but became regular and normal as soon as the bile was again turned into the intestines.

Among his conclusions are the following: The bile is probably chiefly excrementitious, and, like the urine, is constantly being formed and cast out. Though the bile probably assists in the

absorption of the food, its presence in the intestines is not indispensable for the digestion of sufficient food to support life. Increase in weight and good health are quite compatible with entire absence of bile from the intestines. The antiseptic properties of bile are unimportant. Any slight antiseptic quality bile may have is probably derived from its admixture with the gall-bladder fluid. The supposed stimulating effect of the bile on the intestinal walls is not necessary for the regular action of the bowels. The pigment of fresh human bile is biliverdin. The supposed cholagogues administered seemed rather to diminish than increase the amount of bile excreted. These drugs were calomel, euonymin, rhubarb, podophyllin, iridin, turpentine, sodium benzoate. Carbonate of soda, in the form of aerated soda-water, was given, and produced in two hours a maintained increased flow, not succeeded by a marked diminution.

*Tumors—Carcinoma.*—Pepper, in a clinical lecture,<sup>112</sup><sub>Aug.</sub> concluded that the apparent enlargement of the liver, in a case in which abscess or cancer had been suspected, was apparent only, and was the result of a localized peritonitis, which had pushed the liver down. The organ was held down by fibrous bands, the result of organized lymph.

Montgomery<sup>147</sup><sub>Feb.</sub> reports a case of primary hæmorrhagic adenocarcinoma of the liver, discovered by F. B. Carpenter, at a necropsy at the city morgue of San Francisco, in the body of a well-nourished man, 38 years of age, dead of lobar pneumonia. The tumor was a node, the size of a small orange, lying in the depth of the right lobe, directly upon the gall-bladder.

At a meeting of the Pathological Society of Toronto, Greig<sup>39</sup><sub>Sept. 16</sub> called attention to the following interesting points in connection with the specimen of carcinoma of the stomach and liver presented: The age of the patient, 39 years; the absence of family history of cancer; the absence of jaundice until two or three days before death, notwithstanding enormous enlargement of the liver, fully three-fourths of its structure being supplanted by cancer-tissue, and the absence of coffee-ground vomiting, although the cancerous portion of the stomach was a mass of ulceration.

Watkins<sup>506</sup><sub>July 16</sub> reports a case diagnosticated as hypertrophic cirrhosis of the liver, which proved at the autopsy to be a case of cancer of the omentum and of the liver.

Finley<sup>282</sup><sub>Aug.</sub> exhibited for George Ross specimens of secondary cancer of the liver, with extension into the vertebræ, which had given rise to painless paraplegia. The patient had been a woman, aged 50, with primary growth in the breast.

Carter<sup>187</sup><sub>July</sub> remarked that the cancerous liver which he showed at a meeting of the Liverpool Medical Institution illustrated two points, namely, rapidity of growth and apparent health, until pressure upon the common duct of the portal vein caused jaundice and ascites. The patient, apparently in her usual health, had been doing her ordinary household work until within a few days preceding admission to the hospital, when she observed, for the first time, a swelling of the abdomen. Death occurred three weeks later.

A case of apparently primary carcinoma of the liver in a woman aged 67 is reported by Babcock.<sup>231</sup><sub>Jan.1</sub> The duration was about seven months, and icterus did not appear until less than a week before death. Pain was not a marked symptom. Ascites was very great. The necropsy having been incomplete, the limitation of the disease to the liver cannot be unqualifiedly affirmed.

*Sarcoma.*—Delépine, of London,<sup>2</sup><sub>Jan.24</sub> presented several sections of melanotic sarcoma before the Pathological Society of London, in connection with a theory that there was a constant passage of some substance allied to melanin from the epidermis into the cutaneous lymphatics, and that this constant formation of pigment by the skin was probably connected with the formation of hæmoglobin. On the other hand, he had previously ascertained that a great part of the iron set free by the decomposition of hæmoglobin was periodically stored up in the liver, to be used afterward, probably in the formation of fresh hæmoglobin.

*Adenoma.*—Martin-Dürr<sup>7</sup><sub>No.14</sub> reports a case of adenomatous development in a sclerotic liver in a man, 59 years of age, of alcoholic habits. The liver during life was observed to be much enlarged, but was not painful. About the middle of its anterior border palpation discovered a small, round tumor. Purpuric spots appeared on the extremities, and disappeared during the course of the disease. Ascites developed shortly before death. At the autopsy the liver was found enlarged, the surface marked with patches of perihepatitis. On the anterior surface of the right lobe there was a rounded prominence, corresponding on section to a large

nodule of the size of a fist, situated in the midst of the hepatic parenchyma, and having a deep-red hue. This contained a number of small, rounded islets, of golden-yellow color, from each of which, on pressure, a taper-like plug of yellowish material was expelled. In the central portion of the nodule, in the anterior of the sublobular veins, and extending as far as the inferior vena cava, was observed a yellowish pulp, completely filling the veins, but without adhering to their walls. Smaller similar nodules were scattered throughout the left lobe.

The histologic examination showed that the nodules were adenomatous in character, composed of anastomosing and closed acini, and not of hollow tubes. The presence of glycogen could be demonstrated by the reaction with iodine.

*Cystoadenomata*.—Von Hippel<sup>20</sup><sub>No.3</sub> observed, in the liver of an old man dead of transverse myelitis, numerous soft nodules, varying in size from that of a cherry-stone to that of a walnut, some of which were situated immediately beneath the capsule, others scattered throughout the substance of the organ. The gall-bladder presented nothing abnormal. Microscopic examination of sections of the nodules showed them to contain rounded excavations separated by delicate strands of connective tissue, lined with a simple layer of cylindrical epithelium, and filled with a colloid material. At first sight the appearance much resembled that which might be presented by fragments of the thyroid gland implanted in the midst of the liver parenchyma. The neighboring hepatic structure exhibited extensive multiplication of bile-ducts, dilated in places. The interstitial connective tissue was thickened, and at certain places infiltrated with round-cells, at others presenting the fibrillary appearance indicative of an old process.

In the immediate vicinity of the nodes this connective tissue proliferation was most intense, and had separated them from the liver parenchyma by a veritable fibrous membrane. It was possible in places to determine the penetration of the bile-ducts into the alveoli of the tumors. Some of the acini contained blood, others hepatic pigment, others a granular hyaline substance. The author concludes that there may exist true adenomata of the bile-ducts in livers otherwise little altered; that these adenomata may undergo cystic dilatation; that they are of a benign nature, not giving rise

to metastasis; that, unless considerable extension takes place, they may not give rise to any clinical manifestation.

*Syphiloma*.—At a meeting of the Royal Society of Physicians of Vienna, Hochenegg<sup>8</sup><sub>Dec. 11, '90</sub> presented a syphiloma of the liver, about eight centimetres in diameter, that had been removed from a woman 27 years old. He also presented a woman from whom, eighteen months previously, he had removed a carcinomatous gall-bladder, filled with calculi, together with an adjacent involved portion of the carcinomatous liver.

*Hydatid Cysts*.—Potain<sup>212</sup><sub>June 10</sub> has for a long time been able to demonstrate that retraction of the liver is very frequent in lead colic. It disappears with oscillations of augmentation and diminution under the use of purgatives; and the fact is explained by the action of lead, which, deposited in the liver, has the property of causing retraction of the capillaries. This retraction may be produced also in cases in which there is no pain, and Potain calls attention to the diagnostic error which may thus be caused. Cattle<sup>6</sup><sub>Oct. 10</sub> reports a case of hydatid of the liver simulating gall-stones, with rupture through the lung. Operation was attempted; the patient died two days subsequently. A smaller cyst was found adhering to the spleen, and numerous adhesions had been formed with adjacent parts. In addition to these cysts, found post-mortem, there had been several much larger cysts, which were opened and drained.

Cattle<sup>6</sup><sub>Oct. 10</sub> has reported a hydatid cyst of the liver, in a woman 56 years old, in which a diagnosis of hepatic calculi had been made. After a transient attack of vomiting and jaundice, the patient presented progressive increase in the area of hepatic percussion dullness, with irregular outbreaks of fever, with rigors and sweats. At one time there was venous thrombosis of the right leg.

In the progress of the case expectoration of greenish, purulent matter set in, with the development of dullness on percussion at the base of the right chest and the presence of moist râles and gurgling. An incision in the fifth interspace, an inch and a half below and three-quarters of an inch outside of the nipple, gave exit to several ounces of thin, offensive pus, mixed with numerous grape-like bodies, varying in size from a quarter to three-quarters of an inch in diameter. Microscopic examination

of the contents of these bodies disclosed the presence of hooklets. An autopsy was not allowed.

S. West <sup>2</sup><sub>Mar. 21</sub> showed, at the Pathological Society of London, a liver with two hydatids, in which the sacs communicated but the cysts did not. The specimen was taken from a girl aged 16, who had been in good health until two years before she came under treatment. Tapping gave relief, but seven months later it was necessary to repeat the operation and, finally, to operate by incision. Drainage was found to be very difficult, and the patient died a fortnight after the operation. Chauffard and Widal <sup>14</sup><sub>Apr. 19</sub> have made an experimental study on the infectious and dialytic processes in hydatid cysts of the liver. Among other conclusions, they state that the clear liquid of the cysts is strictly aseptic, that it constitutes a good culture medium for microbes artificially introduced, and that the cyst-wall or the membranous envelope of the vesicles is a perfect natural filter, preventing the passage of microbes, but that soluble substances penetrate it readily, whether colloid or crystalloid. To maintain the sterility of the hydatid fluid against such organisms as the bacterium coli communis 1 part in 55,000 of corrosive sublimate sufficed. Of carbolic acid it was necessary to employ too large a quantity to render the method practicable. A saturated solution of naphthol in water was without effect. The authors call attention to the feeble virulence, at least in certain cases of hydatid pus, which they explain by the absence therefrom of pyogenic germs. F. C. Shattuck <sup>99</sup><sub>Jan. 1</sub> reports a case of suppurating unilocular hydatid cyst of the liver, with multiple hepatic abscesses and acute circumscribed perihepatitis. The dullness at the lower part of the right chest with friction sounds, attributed during life to pleural thickening, was found after death to be due to the immense enlargement of the liver with perihepatitis of the superior surface.

In the discussion of Shattuck's case, other cases were reported by P. C. Knapp, R. H. Fitz, and G. B. Shattuck. Fitz said that he had met with at least 12 cases at autopsy where the liver had contained either old or recent echinococcus cysts. I have seen 3 cases clinically. One of these, recently under my care at the Philadelphia Hospital, in the person of a middle-aged Italian, admitted with intense jaundice and high fever, gave no sign by which the nature of the disease could have been ascertained dur-

ing life. Cancer of the bile-ducts, calculi, and other causes of obstruction were canvassed, and the temperature course made abscess one of the conditions discussed. The prostration and low hæmoglobin percentage negatived exploratory incision and operation. No history of the case previous to admission could be obtained. Pain in the right hypochondrium was the only complaint. The liver appeared to be but moderately enlarged. Delirium and coma occurred before death. An old, quiescent, retrograded hydatid cyst, about as large as an onion, was found in the left lobe, while the common duct was found enormously dilated and full of gelatinous material from a communicating cyst situated on the inferior surface of the right lobe. The opinion that hydatid disease is rare in the United States will have to be revised; though, in this connection, the nativity of the patients remains to be carefully studied. A number of cases has, from time to time, found entrance into literature; and, doubtless, there are some unrecorded and many unrecognized. Watkins<sup>506</sup><sub>Feb.</sub> reports a case in which death took place from intercurrent pericarditis and endocarditis. Robinson<sup>6</sup><sub>May 2</sub> reports a successful case of destruction of multiple hydatid cysts of the liver by means of the thermo-cautery. Legludic<sup>17</sup><sub>Aug. 6</sub> reported a case of hydatid cyst of the liver, in a child of 8 years, treated by simple puncture. Recovery ensued without accident. The liquid evacuated contained succinic acid.

*Non-Hydatid Cysts.*—Hayward<sup>267</sup><sub>Sept.</sub> reported a case of multiple cysts, apparently connected with the liver, but external to it, in which, during life, the diagnosis of multiple hydatids was made,—that disease being common in Australia. The patient was a girl  $6\frac{1}{2}$  years old. The symptoms were ascites, enlargement of the liver, displacement of the heart, and difficulty in breathing. Operation was undertaken, and death occurred, five days later, from secondary hæmorrhage. The cysts were apparently developed from the capsules of the liver. Some were sessile and others pedunculated; they ranged in size from that of a pea to that of a large walnut. Two or three of them, more sessile than the others, were imbedded in the anterior margin of the liver, and contained coagulated blood instead of clear fluid.

*Echinococcus Cysts.*—De la Croix<sup>21</sup><sub>Aug. 23</sub> has reported the case of a man, 47 years old, in whom a large tumor developed on the right side of the abdomen and a smaller one in the left hypochon-

drium. A diagnosis of carcinoma was made. Subsequently attacks of severe pains in the epigastrium occurred, with vomiting, anorexia, and weakness. At the same time the larger swelling on the right side of the abdomen almost entirely disappeared; the smaller tumor also diminished in size and became softer. Seven years later the tumors suddenly again appeared; the patient vomited after every meal, lost strength, and finally died. At the necropsy the spleen was found to be enlarged; the abdominal cavity contained a series of tumors, one of which, as large as a goose-egg, was situated at the anterior extremity of the suspensory ligament of the liver, and attached to the omentum. A second and larger tumor was situated at the right posterior angle of the liver, between the latter and the crura of the diaphragm, which were forced apart. A third tumor, larger than the head of a child, was found behind the right half of the stomach, to which it was firmly attached. A fourth tumor, larger than a hen's egg, was situated back of the peritoneal layer, displacing Douglas's *cul-de-sac* forward and the colon to the left. On incision, all of these tumors situated behind the peritoneum were found to contain innumerable echinococcus cysts. The liver was enlarged, its surface smooth; the left lobe contained an echinococcus cyst, almost as large as a child's head, extending into the right lobe. The gall-bladder was dilated and filled with bile. The right kidney was much enlarged, the left kidney abnormally small. The left half of the stomach was dilated; its walls were thin, and the mucous membrane smooth. The glandular ducts of the stomach were moderately swollen. The right half of the stomach was elongated, and communicated by a fistulous passage with the large cyst of the liver situated posteriorly.

At a meeting of the Medical Society of Hamburg, Eisenlohr<sup>34</sup> reported a case of echinococcus of the liver, in a young man 18 years old, with symptoms of gastric derangement, who was suddenly seized with rigors and fever, followed by vomiting and abdominal pain. The right hypochondrium was found distended; the liver was sensitive to palpation, but no cysts could be detected. Subsequently there were remittent elevations of temperature and night-sweats. Transitory attacks of fever, with intermittent swelling of the liver, were followed by slight temporary jaundice. Later on, area of tympanitic percussion resonance

appeared in the midst of the liver dullness. On shaking the patient, a succussion sound could be elicited; washing out of the stomach proved gastroectasis to be absent. Fever again appeared.

Krönlein<sup>214</sup><sub>Aug. 16</sub> has reported, to the Gesellschaft der Aerzte in Zürich, June 2d, the case of a woman 38 years old, who had presented symptoms of cholelithiasis, with a tumor in the right hypochondrium of progressively increasing size. Operation was decided upon, but when the sac was opened it was found to be an echinococcus cyst of the liver. The patient made a good recovery.

*Tuberculous Disease of the Liver.*—J. E. March<sup>284</sup><sub>Jan.</sub> reports a case of tuberculous disease of the liver in a widow aged 25 years. She complained of chills, with severe pains in right hypochondrium and vomiting. The pulse was 140, the temperature 103.5° F. (39.8° C.). The tongue was furred, the bowels constipated. The patient had had several similar attacks during the past year and a half. A diagnosis of impacted gall-stone was made, and treatment instituted accordingly. Exploratory incision was suggested, but declined. The patient improved and relapsed, improved and relapsed, for about a month. A sudden chill was followed by severe pain in the abdomen, increased during micturition. The temperature rose rapidly to 106° F. (41.1° C.) and the pulse to 150. Delirium and uncontrollable vomiting occurred; nutritive enemata were not retained. After a few days, death took place from exhaustion. "The autopsy revealed decided evidence of old peritonitis and a few scattered tubercular masses in the peritoneum, in the abdomen, and pelvic viscera; a gall-stone, nearly spherical, one-sixteenth inch in diameter, weighing 47½ grammes (1½ ounces), in the gall-bladder; and a tuberculous liver, rapidly breaking down." There had been no tuberculosis in the patient's family for more than four generations. At 17 years of age she married; four years later her husband died of tuberculosis. She had remained well up to about eighteen months before death.

#### DISEASES OF THE GALL-BLADDER.

*Cholelithiasis.*—Dochmann<sup>113</sup><sub>Nos. 31, 32</sub> concludes, from experiments on animals, that the formation of gall-stones depends not only upon increased viscosity, but also upon a chemical alteration of the bile, probably an increase of calcium salts and a diminution of sodium salts. The longer the bile remains in the gall-bladder,

the farther does this alteration proceed; from which fact one perceives the etiological importance of too long intervals between meal-times.

Bollinger <sup>34</sup><sub>Apr.28</sub> found, in autopsies performed at Munich, gall-stones present in 5.4 per cent. of the cadavers. The relative frequency of the disease in women, as compared with men, is as 5 to 2. In 111 women with gall-stones, 37 had at the same time constricted liver. Collating over 5000 post-mortem examinations, he found 2.7 per cent. in those from 15 to 30 years of age, 5.9 per cent. in those from 30 to 60 years, and 15.2 per cent. in those over 60 years of age. In the majority of cases the disease is so latent that it is not discovered during life. J. W. Taylor <sup>32</sup><sub>Mar.</sub> maintains that the difficulty in the differential diagnosis between distended gall-bladder and tumor of the right kidney arises when the distended gall-bladder rests upon an enlarged or displaced kidney. The two organs, under ordinary examination, move together and simulate renal tumor. Evidence of the independent movement of the gall-bladder overcomes this difficulty of diagnosis, as illustrated in a recent case of cholecystotomy reported by the same author.

At the Tenth Congress for Internal Medicine, Naunyn <sup>69</sup><sub>Apr.10</sub> enumerated, among the conditions leading to the formation of gall-stones, degeneration of the epithelium of the lining membrane of the gall-bladder. The detritus contains lime-salts, which readily unite with bilirubin. Through detention of bile, absorption of fluid parts, crystallization of cholesterin, these masses become the nuclei of concretions. Another frequent cause of calculi is found in desquamative angiocholitis, which may originate from detention of the bile. The bile-salts are powerful protoplasmic poisons, and, under such circumstances, affect the epithelium of the biliary ducts. In addition, a certain microbe seems to find in stasis of bile conditions favoring its development and infective activity.

Fürbringer <sup>69</sup><sub>Apr.10</sub> presented the results of a study of 64 cases of cholelithiasis, of which 13 were in men and 51 in women. He had almost always been able, on palpation, to detect swelling of the liver, and not infrequently the distension of the gall-bladder, in conjunction with jaundice. In 24 of 41 cases mild febrile symptoms were observed. The pulse may be exceedingly infre-

quent, even though fever co-exist. The most important symptom, from a diagnostic point of view, is jaundice. It is never present at the onset of the colic. It was, however, absent in 31 of 41 cases. Rarely, the presence of gall-stones in the bladder may be detected by a peculiar crepitation. The occurrence of hepatic intermittent fever has no specific importance in connection with hepatic calculi. It is merely indicative of the presence of suppuration. The absence of pain in the right hypochondrium and of jaundice is not an uncommon incident, even when suppurative hepatitis has developed. The local pains do not attain their characteristic violence until inflammation of the peritoneum has been set up. In doubtful cases exploratory incision may be made for the purpose of differential diagnosis. Puncture of the gall-bladder, as a means of diagnosis, is dangerous. Hepatic intermittent fever of hepatitis should not be confounded with typhoid fever and malarial fever. In the attack of biliary colic large doses of morphine and opium are most useful; next in utility are chloral and chloroform narcosis. The solution of gall-stones by remedies administered internally is an illusion. The employment of alkaline mineral waters, conjoined with proper hygienic regulations and keeping the bowels free, constitute the best treatment. When all other measures have failed, and cholæmia and pyæmia threaten, recourse may be had to surgical intervention.

Riedel <sup>34</sup><sub>Apr.30</sub> expressed the view that cases in which gall-stones were small enough to pass through the cystic and common ducts should be reserved for medicinal therapeusis, while those cases in which the stones were too large to pass through these channels should be submitted to surgical treatment. All of 16 cases without jaundice, operated upon, recovered without accident. Of 16 cases attended with jaundice operated upon, 10 recovered without complication, 2 were still under treatment, 4 died. Brunner <sup>34</sup><sub>Apr.28</sub> has reported the case of a woman 66 years old, who—seventeen years ago—previously had an attack of jaundice, lasting four months, but unattended with pain. Thirteen years later she had an attack of typhlitis. Subsequently the patient noticed a flat swelling on the right side of the abdomen, painful to touch, gradually increasing in size. Examination disclosed the existence of a fluctuating tumor as large as a child's head, one finger's breadth below the margin of the liver. On puncture, the tumor was found to be the gall-

bladder distended with pus, and containing two calculi as large as hazel-nuts. The patient was ultimately restored to health.

Thirolloix <sup>7</sup><sub>July 17</sub> presented to the Société Anatomique specimens from a fatal case of intestinal obstruction occurring in a woman aged 45 years, who had had during the last three years of her life several attacks of colic followed by jaundice. For three weeks she had suffered with intense pain in the right hypochondrium, attended with jaundice. For six days there had been no stool nor passage of gas from the intestine. For two days there had been faecal vomiting. The abdomen was tender, but there was no tympanites. Palpation did not elicit evidence of a limited tumor. Operation for artificial anus was undertaken, in the belief that the evident obstruction was due to an epithelioma in the superior portion of the rectum, but resulted in the discovery and removal, through an incision in the intestine, of a calcified gall-stone, six centimetres in vertical diameter and three centimetres in transverse diameter. Death occurred the following day. Vesiculo-duodenal perforation with adhesion was discovered at the autopsy. The gall-bladder contained a whitish, irregular calculus about the size of a large bean. A. Létienne <sup>7</sup><sub>July 24</sub> reported a case of intestinal obstruction, by a large biliary calculus, occurring in a woman of 78 years. Death occurred during operation. There was perforation of the gall-bladder, with adhesion to the duodenum, which was dilated. Histological examination showed that sclerotic changes in the biliary and blood-vessels were far advanced. At a meeting of the Philadelphia County Medical Society, James Collins,<sup>19</sup> pleading for early operation in similar cases, narrated 2 instances of death from obstruction of the intestines and perforation, with peritonitis, due to impacted gall-stone.

Mays <sup>170</sup><sub>Nov.</sub> reports the result of a collective investigation as to the utility of sweet-oil in the treatment of gall-stones, undertaken by the Therapeutic Section of the Philadelphia Polyclinic Medical Society. In all 54 cases were reported, with positive relief in 98 per cent. There were about one-third more females than males among the patients. Mays believes, with D. D. Stewart, that cottonseed-oil is equally efficacious with sweet-oil, and that the beneficial action is due to increase in the biliary excretion, with flushing and lubrication of the passages of the liver. In the discussion many speakers reached conclusions differing from those of the author of the paper.

Fürbringer<sup>4</sup><sub>Apr.20</sub> analyzes 64 cases of gall-stone,—13 in men, 51 in women. In 34 per cent. of the cases cures were observed; in 42 per cent., improvement; in 10 per cent., no improvement; in 14 per cent., death. In those cases referred to the surgical department 4 were cured after operation. Sodium salicylate and olive-oil are considered useful in treatment. Manipulative procedures are not recommended.

Dujardin-Beaumetz,<sup>67</sup><sub>Sept.15, Oct.15</sub> in a lecture on the treatment of cholelithiasis (biliary infectious icterus), believes that stasis of bile in the gall-bladder and desquamative angiocholitis of the liver are the most important causes of biliary calculus. The one is supplementary to the other. Treatment is based upon hygienic regimen and appropriate exercise. All meats are proscribed; the patient lives upon eggs, green vegetables, and fruit. Fish, shell-fish, and game are considered frequent causes of biliary infection. Alcohol must be prohibited. Alkaline waters are given, and cholagogues, such as euonymin and sodium salicylate. Salol, salicylate of bismuth, and sodium bicarbonate, of which 10 grammes ( $2\frac{1}{2}$  drachms) may be made into 30 cachets; with laxatives, such as podophyllin cascara and purgative waters. In the treatment of colic he prescribes large doses of olive-oil, 200 grammes ( $6\frac{5}{8}$  ounces) at a time; and, to get rid of the disagreeable taste, it suffices to rinse the mouth of the patient with water, to which a little brandy or orange-juice has been added. To the olive-oil he adds 20 grammes ( $5\frac{1}{4}$  drachms) of ox-gall. He calls attention to the frequent supervention of urticaria in periods of convalescence from infectious jaundice, as well as after ingestion of mussels or oysters or a puncture of hydatid cysts. He believes this to be due to the pouring into the intestines of infectious matters, toxines, and microbes contained in the bile. The therapy consists in intestinal antiseptics. E. Villemain<sup>62</sup><sub>Oct.</sub> also praises large doses of olive-oil in the treatment of gall-stones and of hepatic colic.

Pürckhauer<sup>34</sup><sub>Sept.1</sub> strenuously advocates the mechanical treatment of catarrhal icterus and cholelithiasis. He advises riding, driving, dancing, and active exercise, continued for hours. The object is to loosen and upset the plug of mucus or concretion that obstructs the ductus choledochus. He reports several illustrative cases. Rheinstein<sup>69</sup><sub>Oct.29</sub> proposes bimanual palpation of the gall-bladder in the diagnosis of the following conditions: (1) an

increase in consistency, whether dependent upon increased tension of the walls or upon the presence of abnormal contents; (2) increase in volume; (3) altered position of the fundus of the gall-bladder downward. To permit of palpation the abdomen must not be distended by fæces; the abdominal parietes must be relaxed; the adipose tissue must not be excessive. The upright position is preferable for examination. In performing palpation the physician stands on the right side of the patient, who breathes quietly, with open mouth. The palmar surface of the left hand is applied to the right lumbar region, the tips of the fingers directed toward the vertebral column. The right hand is placed upon the anterior abdominal wall so that the ulnar border covers the median line and the fingers touch the lower margin of the ninth costal cartilage. The left hand firmly and equably pushes the lumbar region forward, while the right hand pushes in the opposite direction, with each expiration sinking more deeply. If the liver and gall-bladder have descended together the left hand fixes the liver.

*Epithelioma.*—Morin<sup>2054</sup><sub>No.181</sub> has studied the development of primary epithelioma of the gall-bladder. According to this author it may originate in the superficial epithelium of the lining membrane or in the glandular epithelium. Epithelioma of the lining membrane rapidly propagates throughout the liver. There is neither icterus nor ascites at the beginning. The symptomatology resembles that of massive primary cancer of the liver. In epithelioma due to inordinate proliferation of the cellular elements of the glands the lesion is deep, and the rapid compression of the biliary canals gives rise to signs of jaundice from retention. Cancer of the gall-bladder almost always accompanies cholelithiasis.

# DISEASES OF THE INTESTINES AND PERITONEUM.

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## DIARRHŒA.

*Etiology.*—Ortmann, of Keil,<sup>4</sup><sub>No.33</sub> relates a case of severe chronic diarrhœa apparently caused by the protozoön *balantidium coli*. Since its discovery by Malmsten, of Stockholm, in 1856, only 27 cases have been recorded. Authors who relate cases differ in opinion as to whether the *balantidium* is to be looked upon as an indifferent parasite or as the cause of the morbid condition which, in most of the cases, is described as chronic catarrh of the large intestine. Ortmann's case presented the same clinical picture of persistent diarrhœa uninfluenced by treatment. Many microscopical examinations of the stools had been instituted before the parasite was discovered in great numbers in the clots of mucus discharged. No fever being present, the existence of a tubercular condition of the intestine seemed to be excluded; and Koch's fluid, injected to the extent of 5 milligrammes ( $\frac{1}{12}$  grain), caused no reaction. Treatment directed against the *balantidium* was then commenced, after certain experiments had been made as to its mode of life and the effect of medicaments upon it. This latter was carried out by the hanging-drop method: a drop of the medicine was mixed with a drop of the stool containing the balantidia, and examined under the microscope in comparison with a drop of the pure stool. Quinine, of the strength of 1 in 1000, seemed most effectual, the death of the parasite taking place in five minutes, while those in the control drop lived two and a half hours. The bowels were now washed out with clysters of Ems salts, and an hour afterward an enema containing the medicine selected—if tannin, of 1-per-cent. strength; if quinine, of 1 per 1000—was injected and retained for a quarter of an hour. As was

expected from the experiments, the quinine was most efficacious, but the balantidia did not disappear entirely. Quinine was therefore given by the mouth in addition to the clysters; and, to prevent its absorption in stomach and upper reaches of the bowels, it was given in pills coated with artificial keratin.

Ortmann by no means asserts that the parasite was the real cause of the obstinate diarrhœa; but considers this likely from the fact that the purging diminished, and was finally set aside by means which caused the death and disappearance of the balantidia. Three months afterward the patient presented himself at the clinic, and it was found that his stools were of normal consistence. Long search was rewarded by the finding of one sample of the parasite in the mucus of a fresh stool. They were therefore not entirely removed, but existed in numbers insufficient to cause a renewal of the diarrhœa.

*Treatment.*—Alexeëvsky, of Tamboy, <sup>2</sup><sub>Sup., Aug. 8</sub> strongly recommends a simple and cheap method of treatment of chronic diarrhœa, which consists in the internal administration of an infusion of the red-rose petals (*flores rosæ rubræ vel Gallicæ*). To prepare the infusion, a large pinch of the dried flowers should be taken to each tumblerful of hot water, and the vessel allowed to stand in some warm place for two hours. An adult should be given a tumblerful of the rose-tea twice or thrice daily, while a child under 5 years of age should take not more than a tumblerful or cupful, in divided doses, a day. The author relates 3 illustrative cases of very obstinate chronic diarrhœa,—in a lady aged 28, and in two little girls, aged  $3\frac{1}{2}$  and 2 years, respectively. In these cases, after various ordinary means had totally failed, the red-rose course was followed by complete recovery in from one to two weeks. The excellent remedial effects of the flowers are probably to be ascribed to their containing astringent principles as well as an essential oil, which possesses energetic antiseptic and antifermentative properties. The *Rosa centifolia* is said to be less efficacious than the French variety. The method has been borrowed by the writer from the Russian popular medicine. In the latter the dog-rose (*Rosa canina*) is similarly regarded as a powerful antidiarrhœal remedy, and this view was fully confirmed some years ago by Sokoloff and Tchiglovsky, of Omsk, Siberia.

Eccles <sup>15</sup><sub>Dec., '90, Jan.</sub> advises, in the treatment of chronic diarrhœa, rest

and massage. By rest he means physical as well as mental repose (as far as it is possible), combined with warmth of the body. The number and duration of the local manipulations necessarily depend very greatly upon the individual requirements of each case, and no mere routine practice will suffice to obtain the desired result. For this reason it is impossible to prescribe massage for any particular form of chronic diarrhœa so many hours or so many times a day, frequent examination of the patient's abdomen alone affording a reliable indication as to the dosage. Generally speaking, whether in lenteric diarrhœa on the one hand or in sprue on the other, it is advisable to practice abdominal massage at least three times daily, the duration of each application depending entirely upon the immediate results sought to be obtained. In the less serious cases manipulation for about ten minutes or a quarter of an hour, administered within an hour after meals, is sufficient. In graver conditions, however, it is sometimes found necessary to practice local massage both before and after meals, either with or without firm kneading over the shoulders and back. In the earlier stages of the treatment general corporeal massage is practiced once daily, and, as the food taken and the strength and weight of the patient increase, massage of the whole body is given twice daily. The cases of chronic diarrhœa in which the writer has found massage valuable present certain clinical features sufficiently marked to permit of their classification, the different forms being distinguished from each other by characteristic symptoms. While, with the exception of a few of a less serious type, they all exhibit signs of enfeebled digestion, anæmia, emaciation, and debility, the nature of the evacuations affords a readily distinguishable and rational classification of the malady. In lenteric diarrhœa, for instance, as its name implies, the stools afford undeniable evidence of the passage of food-stuffs which have undergone little or no digestion, either in the stomach or intestines, colic and diarrhœa often supervening rapidly after taking a meal, when the predisposition to diarrhœa has existed for some time.

In these cases it is often found useful to employ systematic massage of the abdomen before a meal, the manipulations being initiated by somewhat vigorous rubbing over the hypochondriac and epigastric regions, followed by careful kneading over the whole abdominal wall. Much of the success of the treatment appears to

depend upon the altered conditions of circulation induced by general corporeal massage. In the chronic diarrhœa depending upon climatic influences the application of massage shortly after meals is indicated, and frequently it is necessary to employ it soon after each meal.

The effects of kneading the abdomen may be thus summed up: (a) The generation of gas within the stomach and intestines is diminished and its expulsion effected. (b) The onward movement of the gastro-intestinal contents is favored. (c) The rapidity of circulation through the visceral lymph- and blood- vessels is increased. (d) The circulation through the liver is improved, and thus the destruction of alkaloids by this organ is promoted. In this connection, perhaps, not the least valuable effect produced by abdominal massage is the stimulation to more vigorous action of the diaphragm and the consequent auto-massage, if one may so describe it, produced by the deeper inspirations and abdominal reflexes, excited by the earlier manipulations of the abdominal wall. (e) The abdominal vascular area is dilated. (f) The rate of absorption from the intestines is increased. (g) The intestinal nerves are stimulated. And if the undue secretion of succus entericus in these cases of diarrhœa is due to paralysis of the intestinal nerves, caused by the presence of poisonous alkaloids, the strong mechanical stimulation to which these nerves are subjected may possibly restore their functional activity in controlling secretion from the glands.

#### DYSENTERY.

Bahadurji (Bombay), <sup>2</sup><sub>Oct.24</sub> before the London Medical Society, stated that he had reduced the mortality in dysentery from 5 to 10 per cent. to practically *nil*. He does not look upon the disease as specific or as due to a specific microbe. In his opinion, it is neither infectious nor contagious. He opposes the administration of meat extracts and juices, on the ground that the patient cannot digest them, and that they consequently act as irritants. His treatment comprises three main indications: (1) to avoid all irritants and stimulants; (2) to render the intestinal canal aseptic by putting a stop to injurious forms of decomposition; and (3) to counteract the irritating acidity of the blood by alkalies, at the same time quieting the abnormal action of the intestinal glands. For this purpose he restricts the diet to arrowroot milk, which was suffi-

ciently nourishing and absolutely non-irritating; medicinally, he fulfills the other indications by exhibiting trinitrate of bismuth, Dover's powder, and soda.

## CONSTIPATION.

Nevins<sup>2</sup><sub>Dec. 27, '90</sub> says that in all cases of chronic constipation there is a considerable degree of chronic irritation and subacute inflammation of the cæcum and colon and of the surrounding cellular tissues; this condition not unfrequently becomes acute, and is then recognized as an attack of typhlitis. The effect of this subacute inflammation is reflexly to arrest peristalsis. When a purgative is administered in such cases, peristaltic movements are induced, the irritation is increased, and after the evacuation of the bowels, which is rarely complete, the gut becomes more torpid than before. The administration of pulv. ipecac. co. gr. x (0.65 gramme) at night, combined with turpentine stupes to the abdomen, and followed in the morning by an enema, if necessary, has always resulted, in an experience of a large number of cases of chronic constipation, in a very marked improvement in the patient's condition and a complete evacuation of the bowels. By carefully regulating the diet afterward, and entirely avoiding purgatives, the constipated habit has been almost invariably cured.

The explanation of this result was, that the opium gave the irritated gut a period of rest, which enabled it to recover its tone and afterward act efficiently, while the diaphoretic action of the ipecacuanha, by promoting the secretion from the mucous membrane of the gut, contributed, in an important degree, to the completeness of the evacuation.

In the treatment of chronic constipation Flatau<sup>69 147</sup><sub>p. 976, '90; July</sub> recommends the direct application to the rectal mucosa of about 3 grammes (46 grains) of powdered boric acid. In cases where the mucosa cannot be reached insufflation of the same quantity of powder is employed. In from one-half to three hours after the application peristalsis occurs, attended with copious faecal evacuations. The evacuations may occur two or three times during the day, but are never painful. This method never fails in properly selected cases. Experiments made with other remedies yielded negative results. There is no fear of intoxication, as indicated by a large number of cases treated. In 3 cases failing to yield to other remedies boric acid accomplished the desired result.

C. P. Noble <sup>9</sup><sub>Apr.25</sub> gives the following as a reliable and satisfactory enema:—

R Sulphate of magnesia,	. . . . .	℥ij (62.00 grammes).
Glycerin, . . . . .	. . . . .	℥ij (75.00 grammes).
Oil of turpentine, . . . . .	. . . . .	℥ss (19.25 grammes).
Water, . . . . .	. . . . .	℥ij (60.00 grammes).
M. Sig.: Enema.		

## DUODENUM.

*Ulcer.*—Comparatively little is said in most medical works on ulceration of the duodenum, many of them making no reference to it. This is probably due to the fact that the clinical phenomena so closely resemble those of gastric ulcer that many cases of duodenal ulcer are mistaken for the former disease; in addition, the fact that very often the duodenum is not examined at autopsies doubtless causes some cases to escape notice.

A. McPhedran <sup>39</sup><sub>Dec.16, '90</sub> gives a very complete synopsis of the history, diagnosis, and symptoms of this rarely recognized pathological condition. According to the classical researches of Brunton, in about 5 per cent. of all autopsies evidences of gastric ulceration are to be found; we are much less able to speak definitely on the frequency of duodenal ulceration, but many estimate its frequency at a ratio of about 1 to 30 of the stomach cases.

The first case of duodenal ulcer was recorded in 1828 by Robert, of France, whose description of the symptoms is quite as clear as any that have been written in more modern times. Up to 1881, one hundred and twenty-three authors are given, <sup>2157</sup> and since then, perhaps, half as many have been recorded. Some of these are, doubtless, not genuine, and many are cases of acute ulceration following burns; so that the undoubted cases on record do not, probably, much exceed 100. It is not to be forgotten in estimating the frequency of this affection, however, that many accurately observed cases have not been placed on record.

The relationship of age and sex is in curious contrast to that in the gastric affection; for, while in the latter young females are the chief sufferers, in duodenal ulceration, on the contrary, the majority of those affected are males between 30 and 40. In Krauss's collection of 64 cases only 6 were females. The disease has been met with in the newborn infant, but it is rare in early life. As the ulcers in the two situations seem to be identical in pathology, this difference is strange and at present inexplicable.

Such constitutional conditions as erysipelas, septicæmia, albuminoid degeneration, diseases of heart and lungs, and alcoholic excesses are given as associated with duodenal ulcer; they seem to have no influence in the causation of the same disease in the stomach. A large proportion of the cases have been in apparently exceptionally healthy men, living in healthy environments, and whose nourishment has been ample.

These ulcers occur in the first portion of the duodenum; the other two parts are affected no oftener, probably, than any other part of the small intestine. Physiologically, the portion of duodenum above the orifice of the bile-duct is a part of the ventricular cavity, as its contents are identical with those of the stomach, the acid-chyme not being altered until it meets with the bile and pancreatic fluid. This fact, together with the similarity of simple ulcers in the stomach and duodenum, leaves little room for doubt that both owe their origin to a common cause. As to the pathogenesis of these simple ulcers, little advance has been made on the views originally expressed by Virchow and others, viz., that there is, first, arrest of blood-supply to a portion of mucous membrane; then, secondly, solution or digestion of this ischæmic membrane by the gastric juice,—hence the designation “peptic ulcer.” The arrest of blood-supply may be due to such causes as embolism, thrombosis, extravasation of blood from trauma, degeneration of arterial walls, etc. Some believe that abrasion of the mucous surface by a hard, indigestible substance may originate an ulcer, and that such cause would be more likely to be effective in the duodenum on account of its narrow lumen and fixed position. If this be so, it offers some explanation, possibly, for the more frequent occurrence of duodenal ulcer in males, and at a more advanced age than in the gastric affection.

It is uncertain how long it takes the simple peptic ulcer of the duodenum to cicatrize; the time probably varies, as it does in gastric cases, from a few months to several years. With cicatrization complete, the sufferer is not wholly free from danger, as such untoward results as stricture of the gut, obstruction of the hepatic or pancreatic ducts, the portal vein, or hepatic artery, are possibilities to be borne in mind.

The clinical history varies greatly in different cases. Even in those with the most marked symptoms it is at least questionable

if we can give more than a very probable diagnosis, as there will always be an element of doubt. The phenomena on which Bucquoy, Johnston, and others have laid most emphasis are: 1. Sudden intestinal hæmorrhage in an apparently healthy person, tending to recur. With or preceding this there may be hæmatemesis, if the bleeding has been sudden or free, so as to regurgitate into the stomach. 2. Pain in the right hypochondriac region, occurring late after meals,—two to four hours. 3. Gastric crises of extreme violence and without reference to food. Hæmorrhage is apt to occur at the time of these crises. Of these symptoms the intestinal hæmorrhage is considered the most important. Occurring in the absence of such common lesions as hæmorrhoids, dysentery, malignant and tubercular disease, and the hæmorrhagic diathesis, duodenal ulceration, it is said, may be recognized by this one symptom alone; yet fatal intestinal hæmorrhage has occurred without any of these causes, and no ulcer been found in the stomach or duodenum. The occurrence of pain after meals is not present in all cases,—not, probably, in more than half of them, if in so many even. Its cause is usually referred to the passage of the chyme through the duodenum, in which case the pain should begin within half an hour after the meal,—*i.e.*, as soon as the chyme begins to pass,—unless it be due, as some believe, to the greater acidity of the latter part of the chyme. Several cases have been reported during the last few years, in which there were no symptoms present until perforation occurred, with peritonitis, followed by death in a few hours.

The specimen presented by Wilberforce Aikins<sup>39</sup><sub>Dec. 16</sub> is one of this kind. It is from a man, apparently in good health, who was seized during the night with sudden, extreme pain in the abdomen, diffused all over it. He died next day. At the autopsy a large oval ulcer was found in the anterior wall of the pyloric orifice. Such cases are probably not rarely mistaken for strangulation of the bowel, but the rapidity with which collapse sets in should nearly always serve to distinguish them from strangulation, in which collapse develops more gradually. In perforation of the duodenum the opening is nearly always found in the anterior or upper walls; when the ulcer is in the lower wall, adhesion to the pancreas usually prevents perforation into the peritoneal cavity.

In like manner many cases of gastric ulcer are met with in

which there are no symptoms until perforation occurs. This appears to be especially true of ulcers situated in the lesser curvature, where they seem to be removed, to a certain extent, from irritation by the chyme. It should not be forgotten that, in some cases of duodenal as well as of gastric ulcer, so much thickening takes place about the base of the ulcer as to give rise to evidences of tumor,—those strongly simulating malignant disease.

Few will be inclined to dispute Wilson Fox's opinion <sup>2158</sup> that the symptoms of duodenal ulcer differ but little from those which are met with when the disease occurs in the stomach. Pain is much oftener absent in the duodenal disease, owing, some believe, to this part of the canal being more fixed, and subject, therefore, to less movement than the stomach. When present, as already remarked, it is often extremely severe, making the patient writhe while it lasts; it may occur at regular intervals, without reference to food, as, *e.g.*, at night; or, if due to food, it is said to begin from two to four hours after the meal, but may, doubtless, occur as early as half an hour. The occurrence of such pain in the right hypochondrium, in absence of other symptoms, is considered sufficient by some to establish a diagnosis of duodenal ulcer.

As to the significance of hæmorrhage, in the absence of causes, in the lower bowel, sudden profuse discharge indicates strongly the duodenum as the seat of bleeding, as do also repeated small bleedings; in the latter case the blood is all tarry. In gastric hæmorrhage, if small, the blood passed by the bowel will probably be found more altered by the action of the gastric fluid, and, if large, the vomiting will be more prominent than the alvine evacuations; while the converse probably holds true when the bleeding is duodenal.

Lebedensky <sup>25 Jan.</sup> details the case of a previously always healthy and well-nourished soldier in whom, a few hours after a somewhat heavy supper, there suddenly appeared excruciating abdominal pain, intense and frequent, but ineffective "calls" to defecation, and frequent vomiting. When examined shortly afterward the patient was suffering from collapse, his abdomen being considerably distended, but not tender; the pulse filiform, the cardiac sounds exceedingly weak, the respiration shallow and quickened, and the temperature strikingly subnormal (33.6° C.—92.3° F.). A repeated administration of castor-oil and enemata failed to move the

bowels. Under the influence of anæsthetics, the temperature gradually rose to 36.7° C. (98° F.), while several hours later there supervened fever, accompanied by a diffuse tenderness of the abdomen and further aggravation of abdominal pain. About thirty hours after the first symptoms the man died. The post-mortem examination revealed general acute peritonitis, with an enormous quantity of dirty, reddish fluid in the peritoneal cavity. In the upper horizontal portion of the duodenum there was discovered a perforating circular ulcer of the size of a six-penny piece, with irregular, slanting, congested edges and a similarly congested base. No ulcers or scars could be detected in other portions of the gastrointestinal tract. The stomach contained two ascarids, twenty and twenty-five centimetres long.

Rindfleisch <sup>69</sup> Feb. 5; <sup>90</sup> Mar. gives the following explanation in regard to the histological changes in the healing of tubercular ulcers of the mucous membrane under Koch's treatment: The non-vascular tubercular granuloma is incapable of reaction. It acts as a weak irritant to the healthy tissue, and produces a round-celled infiltration. Specific changes, the development of tubercle or caseation, may take place in this infiltration. Koch's fluid brings about an acute inflammation, which leads to a separation between that to be cut off and that to be converted into fibrous tissue; hence the cleaning of the ulcer. The mucous membrane is very red. As to the tubercles in the neighborhood not involved in the ulcer, they are more sharply defined. This is owing to the conversion of the epithelioid cells into blunt, spindle-shaped cells, which are arranged around the nodule. The giant-cell is also altered, and it throws out processes which make their way toward the connective tissue round about. In all the infective granulomata we have an inflammation to deal with, the final product of which is connective tissue. The micro-organism tends to hinder this process and to produce a necrosis. Under Koch's method the normal development of scar-tissue is attained, and the tissues rendered immune against the bacillus.

*Stenosis.*—The symptoms of stricture of the duodenum are so closely allied to pyloric stenosis that their differentiation is often obscured. Masius <sup>293</sup> June gives the history of a case of stricture below the ampuli of Vater of peculiar interest. It was caused by a small, round-celled, sarcomatous deposit located in second part

of the duodenum. The symptoms were: violent pain over the pyloric region, large and frequent vomitings, acid regurgitations, and pain in the head. The stomach was much dilated, the vomited matter contained much bile, and in the contents of the stomach were always found a notable quantity of hydrochloric acid and bile and non-digested food, especially amylaceous material.

Boas <sup>69</sup><sub>July 9</sub> gives the history of several cases of reported stenosis of the duodenum below the ductus choledochus. He refers to the great difference of the symptoms of stenosis above and below the duct: those above resembling in every particular pyloric stenosis, while those below are manifested by a continual vomiting of bile or the permanent presence of bile in the chyme of the stomach. In the first case, reported by Riegel, the cause of the retroflow of bile was a calculus impacted in the bile-duct, which lifted the back part of the duodenal wall very much, thereby causing the flow of bile toward the stomach. The cause of death in this case was considered due to the effect of bile on the stomach digestion. The second case (Cohn) was caused by a sarcoma of the upper retroperitoneal lymph-glands, which completely compressed the duodenum. The third case (Riegel) was caused by a carcinoma of the jejunum. The fourth case (Honigmann) ran its course like ileus, recovery being accomplished by washing out the stomach; the main symptom in this case, also, was the continual presence of bile in the stomach.

The next most frequent causes of stenosis of the duodenum are neoplasms of the pancreas. Boas reports 3 cases of his own: the first case, in which there had been hæmatemesis, pain in right hypochondriac region, and about two hours after eating vomiting and loss of flesh. By examination with a stomach-pump about a quart of dark, bilious, odorless chyme was removed. The microscopical examination of this showed no sarcinæ or torulæ, reaction slightly acid; never gave the free hydrochloric test, but it contained much peptone and egg-albumen, and fibrin was easily digested by it. This patient died three months later with all the symptoms of perforative peritonitis, though no post-mortem was permitted. He considered this stenosis as due to duodenal ulcer. The other 2 cases showed bile in the stomach, with dilatation, and were treated with good effect by washing out the stomach; he attributes them to some direct disease of the duodenum. Both patients are still living.

The differential diagnosis between this condition and pyloric stenosis is shown by the absence of fermentation products (sarcinae and torulae), the presence of indican in urine, also of acet-acetic acid and acetone, and the clayey stools.

#### APPENDICITIS, PERITYPHLITIS, ETC.

*Diagnosis of Appendicitis.*—An important aid in the diagnosis of appendicitis <sup>105</sup><sub>Mar.1</sub> is what is now called the McBurney's point, which consists in the ascertaining by the pressure of a single fingertip that the point of the greatest tenderness is, in the average adult, almost exactly two inches from the anterior iliac spine, on a line drawn from this process through the umbilicus. Much greater tenderness at this point than at others, taken in connection with the history of the case and the other well-known signs, is looked upon by its author as almost pathognomonic of appendicitis. This point indicates the situation of the base of the appendix, where it arises from the caecum, but does not by any means demonstrate, as one might conclude, that the chief point of disease is there. The abscess, or concretion, or cyst, may be at quite a little distance, but the greater pain on pressure with one finger will be felt at the point described. (See Section C., vol. iii.)

*Treatment.*—Bigelow <sup>998</sup><sub>Oct.</sub> has collected 90 cases of appendicitis, and classified them with special reference to age, sex, diagnosis, and treatment. Of these 90 cases, 73 per cent. were under 30 years of age; 76 per cent. were males; 24 per cent., females. The diagnosis in 86 per cent. of the cases was appendicitis; 10 per cent., perityphlitis; 4 per cent., typhlitis. It was noticeable, in collecting these cases, that those more recently reported were, in nearly every instance, cases of appendicitis, while a few years ago the names perityphlitis and typhlitis were used frequently. The treatment in 71 per cent. of these cases was by operation. In some instances the operation consisted in simply opening a pus-cavity and allowing the pus to escape; in others the appendix was sought for, ligated, and removed; in others still, where a general peritonitis was found, the whole peritoneal cavity was thoroughly irrigated and drained. The results of operative procedure, taken as a whole, were 65 per cent. recoveries; 29 per cent. of the cases were not submitted to any operative procedures. Of these, 75 per cent. recovered. In over half of the cases (54 per cent.) in which operative procedures

were resorted to the operation was done during the first week, in a number of instances as early as the second or third day. Of these, 57 per cent. recovered.

In a little less than half of the cases (46 per cent.) the operation was done after the first week; in 1 case as late as the sixtieth day. Three out of 4 of these cases recovered. In the fatal cases death occurred during the first week in a little over one-half of the cases (53 per cent.).

*Perityphlitis*.—In the treatment of perityphlitis Nothnagel<sup>64</sup><sub>Aug.13</sub> uses at first about ten leeches, besides ice-bags, ice-compresses, or Leiter's cooling apparatus. If cold applications or ice are not agreeable to the patient, then hot compresses may be used. Later on, painting with iodoform, collodium, or tincture of iodine and tincture of gallarum (equal parts); rubbing with *sapo viridis* may be tried if the resorption of the exudate is delayed; quite often a mild tonic, such as *tinctura cinchona comp.*, may be given. To alleviate marked pains, morphine is recommended. If the inflammatory stage has passed during convalescence saline cathartics should be used. Massage with *sapo viridis* is recommended to counteract the sensibility to pressure. In old peri- or para-typhlitis, in cases in which permanent non-absorbent exudates exist, he recommends poultices, warm salt water, or mud fermentations; also, warm mud or brine baths. Massage is also to be recommended in such cases. Regarding surgical interference, Vollert<sup>69</sup><sub>Aug.13</sub> advises it only if positive evidence of an abscess is present. During the first days it is not wise to operate, as the case may be cured under the above treatment. But if it is found that the exudate becomes chronic, if suppurative fever is present, then an operation would be justified. The most favorable cases for operation are those in which circumscribed encapsulated perityphlitic exudates exist. Still, there are cases on record in which large paratyphlitic abscesses were cured by correct internal medication. If general peritonitis is present, the prognosis is bad. Resection of the vermiform appendix is recommended if perforated, providing no adhesions exist between it and the cæcum, the mesentery, or other intestinal loops.

Saundby<sup>32</sup><sub>Sept.</sub> defends the medical treatment of perityphlitis against surgical interference by the presentation of the histories of 15 cases occurring in his own practice. Of these 15, 1 died, and he was the only patient subjected to surgical operation. The

plan of treatment was rest, free evacuation of the bowels, hot fomentations or ice-bags, with the addition, in chronic cases, of repeated blistering over the tumor.

Lange<sup>1</sup><sub>June 6</sub> attributes the fact that perityphlitis is unusually common in America to two of our natural failings,—that of eating too much and chewing too little, the result of which is constipation. In cases that go on to the formation of an abscess he recognizes three typical situations of the purulent collection; in the first class it surrounds the cæcum, and ascends above the outer half of Poupart's ligament and the adjacent portion of the ileum to the anterior abdominal wall; in the second it lies more behind the cæcum, toward the lumbar region; in the third it tends toward the median side of the cæcum, and subsequently causes distension deep in the true pelvis. These varieties run into each other frequently, but it is of practical utility to distinguish them as types. Lange takes a decidedly conservative stand in the matter of treatment. While he admits that there are cases in which laparotomy cannot be resorted to too early, he deprecates its performance in the general run of cases,—cases of circumscribed suppuration,—for they almost always go on to complete recovery after simple incision and drainage. The dread of still leaving a diseased appendix, and possibly a coprolith, is practically unfounded. The physician should watch the patient most minutely from the first to the third day, and call in the surgeon immediately on the occurrence of an unfavorable turn, and not twelve hours later. A particularly ominous condition is that in which, in an adult, the pulse rises above 120 and the breathing is correspondingly hurried, often with a subsequent cyanotic appearance,—all these symptoms being entirely out of proportion to the pain, tympanites, and other abdominal signs, and seeming to indicate poisoning. In one such case Lange has noticed a slight sweetish odor of the breath. In none of them—and he mentioned a number—has laparotomy saved the patient; rather has it seemed to hasten the fatal issue. He suggests the possibility of finding an antidote to the poison, and hints that this may prove of more avail than surgical interference.

In a few of the grave cases where progressive peritonitis seems to be going on, and where, so early as the second or third day, it seems to be too late to hope for any good from laparotomy, the operation is postponed, the system rallies from the first shock

of the disease, in a few days the patient is in condition to bear abdominal section, and its performance proves successful. In cases where one is perplexed by the dilemma that an immediate operation will hasten death, and that death without an operation is almost sure to take place from advancing sepsis, Lange is disposed to temporize.

The rational treatment of typhlitis is summarized as follows <sup>25</sup><sub>Apr.</sub>: 1. Absolute rest: during convalescence the avoidance of prolonged standing, long walks, or great physical efforts. 2. Alimentary hygiene: avoidance of errors of diet—copious or irregular meals—and combating of dyspepsia and dilatation of the stomach; diet should consist of milk, yolks of eggs,—food leaving but small residue (Bouchard). 3. Local treatment: for the pain, injections of morphine; as antiphlogistics, inunction with mercurial ointment, poultices, rendered aseptic by boric acid and anodyne by laudanum; prolonged baths. 4. Internal treatment: aim at intestinal antiseptis,—(a) by purgatives, such as salicylate of magnesia in moderate and repeated doses; (b) by large intestinal irrigations, which should be repeated twice daily if possible. Bouchard's favorite formula is the following:—

R Sodii bibor.,  
Tinct. benzoini,  
Spiritus camph., . . . . . āā 5 grms. (75 grains).  
Aquam (98° F.—36.7° C.), . . . 1000 c.cm. ( 1½ pints).

Sig.: For each injection.

*Anomaly of Appendix.*—F. N. Manley <sup>170</sup><sub>May</sub> reports a case where at autopsy was found a marked anomaly in the position of the appendix. He says that in the post-mortem, though careful search was made, no appendix could be discovered; but on carefully detaching the cæcum, which had a broad cellular investment posteriorly, he came upon the appendix, which was coiled on itself, imbedded in cellular elements on the surface of the iliac fascia, entirely outside of and behind the peritoneal cavity.

The surgical importance of this anomalous position of the appendix cannot be overestimated when, through pathological changes, operative measures are imperative. He reports a case in point, where, on operation, the abscess was found behind the cæcum and the appendix was discovered in the position above described.

*Dropsy of the Appendix.*—Paul Guttman<sup>69</sup><sub>Feb. 12</sub> presented a unique specimen of dropsy of the vermiform appendage found in a woman who died at 72 years of age. The opening into the cæcum from the appendix was closed by hard, fibrous bands, consequent to chronic peritonitis. The process measured fourteen centimetres long and twenty-one centimetres in circumference, which is thirty-two times the normal circumference of the appendix.

#### INTESTINAL OBSTRUCTION.

A case of volvulus of the entire small intestine occurring in a youth of 19 years is reported by Ashby,<sup>2</sup><sub>Jan. 21</sub> in which the only symptom was vomiting, which had occurred at intervals from birth. The necropsy showed the immediate cause of death to be acute volvulus, involving nearly the whole of the small intestine, the last few feet of the ileum being twisted from right to left around the upper part of the jejunum, below its own axis. The stomach was found immensely dilated and hypertrophied; the duodenum was also dilated, looking like a second stomach. The lower part of the duodenum and the upper part of the jejunum were surrounded and in part constricted in front by fibroid adhesions, with some cretaceous deposit, the result of old (probably fœtal) peritonitis. About six inches of gut were thus bound down. There was no complete obstruction, as a forefinger could be readily passed through the narrowest part. A sister of the patient had died of acute peritonitis. The history of vomiting from birth was so definite that there seemed to be no doubt that the lesion (adhesions) described was congenital.

A remarkable case is recorded by Skerritt,<sup>806</sup><sub>Apr.</sub> in which a fatal attack of obstruction was caused by fibrinous effusion into the ileum, three inches above the ileo-cæcal valve ("exactly like the false membrane in croup"). There were also peritoneal adhesions and an abscess-cavity. The attack had lasted one week, and had been wholly unattended by fever. It had begun with pain and sickness. On the first day there had been diarrhœa, but constipation ever afterward. It appeared almost certain that perforation of the vermiform appendix had been the starting-point.

Langdon<sup>53</sup><sub>Apr. 1</sub> gives the following classification of intestinal obstructions by situation and cause:—

LESION SITUATED.	1. IN LUMEN.	{		a. Faecal impaction.	
		{		b. Enteroliths.	
		{		c. Foreign bodies.	
	2. IN WALLS.	{		d. Malformations.	{ Ano-rectal septum. Absence of portions of bowel.
		{		e. Paralysis or paresis.	{ Central. Muscular,—from distension. Toxic,—lead, opium, etc.
		{		f. Inflammation and its results,—cicatrical stricture.	
		{		g. New growths.	{ Benign. Malignant.
		{		h. Displacements.	{ Volvulus. Intussusception.
	3. OUTSIDE WALLS.	{		i. Enlarged viscera.	
		{		j. New growths.	
		{		k. Displacements.	{ Internal strangulation. Hernia.

### UNIVERSAL SYMPTOMS OF INTESTINAL OBSTRUCTION.

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| <p>1. Nervous symptoms:<br/>Pain.<br/>Anxiety.<br/>Collapse.</p> <p>2. Circulatory symptoms:<br/>Pulse frequent, feeble, and small in non-inflammatory states; frequent and "wiry" in inflammatory states.</p> <p>3. Respiratory symptoms:<br/>Accelerated shallow respiration.</p> <p>4. Digestive symptoms:<br/>Constipation.<br/>Vomiting.<br/>Intestinal distension.</p> | <p>5. Urinary symptoms:<br/>Urine diminished in acute cases and cases with collapse; increased in chronic cases in early stages.</p> <p>6. Reproductive symptoms:<br/>Negative (except in appropriate lesions outside bowel).</p> <p>7. Voluntary motor symptoms:<br/>Flexed thigh and leg.</p> <p>8. Tegumentary symptoms:<br/>Jaundice.<br/>"Clammy" skin.<br/>Abdominal distension.</p> |
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### DIAGNOSIS OF INTESTINAL OBSTRUCTIONS.

	General History.	Location and Quality of Pains.	Location and Character of Tumor.
A. Faecal impaction.....	Onset slow; adult females predominate. Habitual constipation, confinement after labor, fracture, etc. Insanity predisposes. Collapse long postponed or absent.	(1) Sigmoid; (2) caecum; (3) transverse colon. Dull pain and sense of weight. Slight tenderness on pressure. Colicky exacerbations.	(1) Sigmoid; (2) caecum; (3) transverse colon. "Doughy" or impressive. Position changeable by posture. Tympanites gradually increasing above tumor.
B. Enteroliths.....	Onset sudden (from shifting stone). Magnesia habit (clay or slate-pencil eating, etc.).	Lower end of ileum, caecum, or sigmoid flexure. Localized tenderness on palpation. Constant localized pain, with colicky exacerbations from tympanites.	Tumor at right or left iliac region; hard, circumscribed, only slightly mobile.
C. Foreign body.....	Onset sudden, preceded by chronic history of hurried eating, imperfect mastication, swallowing of bones, etc. (fish diet), history of previous attacks of hepatic colic. Insanity with pica.	Caecal or sigmoid usually resembles B.	Similar to last (B).
D. Malformation.....	Newborn infant. No movement of bowels since birth. Collapse early, unless relieved.	General abdominal pain due to distension. Tortuosa.	No circumscribed tumor. General abdominal distension, due to retained meconium and tympanites. Rectal exploration may reveal bulging septum.
E. Paralysis.....	Onset gradual. Central lesion, traumatism, haemorrhage, new growth. Chronic constipation. Lead or opium exposure.	Umbilical in location from distension and traction. Neuralgia in lead poisoning; absent in opium cases.	Solid tumor; colonic from faecal accumulation. Tympanites from distension of small intestine, except in lead cases, where retraction of abdomen prevails.

<i>General History.</i>		<i>Location and Quality of Pains.</i>	<i>Location and Character of Tumor.</i>
G. New growth (intra-mural)....	Onset gradual; progress slow. Cachexia in malignant growth. Stools like preceding.	Circumscribed, usually in sigmoid or rectum; gradually increasing in severity.	Same as preceding.
H. Displacement (intra-mural).	Volvulus....	Onset sudden (youth or adult life), after unusual exertion or position. Previous good health. Peritonitis soon complicates case. Collapse early, if unrelieved.	Localized sigmoid distension, at first, soon becoming general.
	Intussusception....	Onset sudden (infancy). Straining at stool; bloody and mucous discharges.	No local tumor. Tympanites marked. Small intestine may present at anus.
I. Enlarged viscera.....	Onset slow; physical exploration reveals cause.	Usually cæcal or sigmoid. Dull (usually due to impaction). See A.	In situation of enlarged viscus, and at sight of impaction behind. Alternating tympanites and flaccid walls.
J. New growths (extra-mural)....	Onset slow; symptoms preceding obstruction. Cachexia in malignant growth.	At site of tumor, and radiating in accordance with nerve distribution involved.	Usually in posterior abdominal wall, liver, or omentum. Pelvic viscera.
K. Displacements (extra-mural).	Internal strangulation....	Onset sudden; previous peritonitis or perityphlitis; sudden effort (lifting, etc.). Collapse ensues early, if unrelieved.	No tumor recognizable, excepting tympanites.
	Strangulated hernia....	Onset sudden; history of old hernia, or previous attacks with reduction.	At one of the "rings"; perhaps reducible by taxis.

*Treatment.*—Washing out of the stomach, as first recommended by Küssmaul, in intestinal obstruction, is regarded by Aufrecht<sup>116 Aug. ; 15 Oct.</sup> as a useful addition to our therapeutic measures. The difficulty is to determine in which cases and under what circumstances it should be carried out, as it is not equally applicable in all cases. On the ground of experience, Aufrecht recommends two special indications. The first and most important of these is distension of the stomach, where vomiting is not present or has ceased suddenly. It is estimated that this condition is seen in about one-fifth of all cases of ileus, and its recognition may be made by percussion, the extended, deep, full note distinguishing it from a distended colon. The absence or cessation of vomiting is often looked upon as being due to the œsophagus being folded over the opening in the diaphragm, and its lumen blocked. However that may be, introduction of a tube takes place without difficulty, and evacuation of a large amount of fluid gives great relief, often without any washing out. A further indication is the occurrence of feculent vomiting. Repeated cleansing of the stomach removes the abnormal contents and prevents the absorption of injurious material. Aufrecht pleads for the use of morphine in all cases,—used subcutaneously. It should be given three or four times daily, according to need, until the patient is free from pain and peristalsis is kept within bounds. Its use by the mouth

should be discontinued,—its action not being prompt, and the amount absorbed uncertain. Large injections into the bowel he has long ago given up. Only in the very early days can one hope to obtain any useful result. He tried intestinal puncture on two occasions; but no particular good was observed, and he was dissuaded from continuing it by peritonitis being set up in one of the cases.

Daniels<sup>186</sup><sub>May</sub> reports a case where the injection of coal-oil in intestinal obstruction, through a long rectal tube, followed by the injection of about a pint ( $\frac{1}{2}$  litre) of warm water, caused a free evacuation after all other means had failed.

The usefulness of olive-oil as a solvent for fæcal accumulations has had many supporters in the past, whilst others have failed to obtain good results from its employment. A number of cases are reported by E. W. Michell<sup>53</sup><sub>Jan.17</sub> where large quantities of olive-oil, varying from a pint to a quart ( $\frac{1}{2}$  to 1 litre), in divided doses, have been successful.

Mortimer<sup>6</sup><sub>May 23</sub> says that the dangers of the treatment of intussusception by injections and inflations have been brought more clearly to the notice of the profession by a series of experiments tried in post-mortem cases. It was then found that in pressure corresponding to an elevation of only six feet there may be complete rupture of the bowel.

While such measures should be tried with caution before laparotomy is resorted to, nevertheless it must be remembered that the gut-wall is inflamed and weakened in this condition, and that even the results on normal intestine cannot be taken as a guide.

It must be conceded that abdominal section, with proper precautions, is hardly more dangerous than the treatment by inflation; the latter being only admissible in the first three days and in cases not presenting symptoms of an acute strangulation.

#### FOREIGN BODIES IN INTESTINES.

Myles<sup>2</sup><sub>Feb.7</sub> showed to the Royal Academy of Medicine in Ireland an enterolith, and gave details of a case in which symptoms of complete intestinal obstruction were produced by it. The patient was a lady aged 65, who had suffered fifteen years before from hepatic colic, and since then from chronic constipation. This culminated in an attack of complete obstruction, necessitating relief

by operation. Myles performed laparotomy, and found the gut completely blocked by the calculus lodged in the ileum, the part above distended and that below completely collapsed, the calculus fixed and immovable. J. P. Tuttle<sup>July 11</sup> reports a case of a child aged 5 years who, while playing with a bent pin in her mouth, suddenly caught her breath and drew the pin into her throat. It lodged in the fauces, but, upon her mother's attempting to remove it, was dislodged and swallowed. This occurred on the 12th of December. Fearing too great peristaltic action with a sharp-pointed foreign body in the alimentary canal, no cathartics were given, but the patient was fed on food containing a large proportion of excrementitious matter, and the stools constantly examined to find the pin if it should pass. Ten days elapsed, and, nothing having been seen of it, it was about concluded that it had imbedded itself in some of the intestinal folds or had been overlooked in the dejections, when the father called to say that the child had passed the pin upon urinating that morning. She complained of sharp pain upon making her water, and, looking into the vessel, found the pin,—somewhat corroded, but otherwise just as she had swallowed it. The passage of the pin through the intestinal wall is not so remarkable as its passage from the bladder after it had once fairly entered that organ. Of course, it is possible that the pin may have passed from the rectum through the vagina, and not entered the bladder at all, but the child's symptoms indicated irritation of the latter organ.

N. F. Mentin, of Warsaw,<sup>586 2  
Mar. 28; Aug. 1</sup> details a very rare case of intestinal concretion discovered post-mortem in the cæcum of a woman who had been suffering from chronic intestinal catarrh, for which she had been treated by the internal administration (amongst other things) of subnitrate of bismuth. The concretion was bean-shaped, one centimetre long, of a dirty, brownish-yellow color, odorless and tasteless (*sic!*), light, porous, friable, and easily reducible to powder. It weighed 0.8853 gramme ( $13\frac{4}{8}$  grains), but after two hours' exposure to 100° C. (212° F.) the weight fell to 0.8575 gramme ( $13\frac{41}{100}$  grains). Under the microscope the enterolith was found to consist of very minute amorphous granules. Chemical analysis showed that the concretion was composed of 85 per cent. of subnitrate of bismuth with 15 per cent. of some organic substance (probably insoluble remnants of faecal matter).

Von Schroeder, Sr., of St. Petersburg, <sup>25</sup><sub>Mar.</sub> relates an instructive case of a man aged 53 who, during the last twenty-three years, had been suffering from agonizing attacks of abdominal colic, obstinate habitual constipation, hæmorrhoidal bleedings, meteorism, cardiac palpitation, and headache. During the last five years or so his stools were occasionally followed by spells of spasmodic abdominal pain, with discharge of thready or flocky mucus. In the course of such an attack a hard foreign body was discharged, after which the patient gradually lost all his symptoms. The foreign body proved to be a friable, bean-shaped, pale-brown calculus, measuring three and a half by one and a half centimetres, and weighing 4 grammes (62 grains). It was composed of a thin superficial stratum of a pale-brown color, and a thicker grayish inner layer, with a small, white, central nucleus. The concretion consisted of carbonate and phosphate of lime, its external layer containing a large proportion of red oxide of iron. The presence of the latter constituent may be easily explained by the fact that five years previously the man had been treated by the Marienbad-Kreuzbrunnen mineral water, containing chalybeates in the form of carbonate of iron.

## PERITONITIS.

In 6 cases of perforation in typhoid which occurred at Florence during the past winter Barbacci <sup>376</sup><sub>Aug. 15</sub> made careful observations of the peritoneal exudation. The perforation was always in the lower portion of the ileum; 4 times it was single, and in the other 2 cases two ulcers had given way close to each other. In each case cultivations were made on gelatin and nutrient agar; guinea-pigs and white rats were also inoculated with the exudation material. In 4 cases plate cultures were also made from the intestinal contents taken from the base of the ulcers and also from the heart-blood. In all 6 cases only one species of microbe developed from the cultures, and the author identifies this as the bacterium coli communis. The results of the inoculations on animals showed in 3 cases also the presence of diplococcus lanceolatus capsulatus of Fränkel, but it was noted that the virulence of this was very slight, disappearing rapidly on being passed through a second animal. Very few and feeble colonies could be obtained from the blood of these animals, and the author thinks that this microbe was only an accidental impurity. He regards the bacterium

*coli communis* as the true cause of the perforation and peritonitis. He appears to have satisfied himself that it was this organism, and not the *bacillus typhosus* of Eberth, which was present in his cases, although, as he himself admits, the distinction between these two species is very difficult. Much evidence has lately been advanced to prove the close relations between these two bacilli; but, however this may be, the results above described are of great interest, as is also another case mentioned in the same paper, in which the author withdrew by aspiration some pus from a case of suppurative perityphlitis, and obtained from it pure cultures of the same bacillus. R. R. Ball<sup>1</sup><sub>Jan. 10</sub> reports a case of acute peritonitis following copious enemata of a salicylated solution (1 drachm to 1 pint—375 to 480 grammes). He suggests as a cause that the solution escaped through some of the minute unhealed portions of the recently inflamed bowel into the peritoneal cavity.

W. J. Greig<sup>39</sup><sub>July 1</sub> reported the following case to the Toronto Medical Society: A woman, pregnant at the seventh month, fell down-stairs and sustained a fracture of the fibula. Labor came on a few days after the accident, and the child was born apparently well developed. It was noted soon after birth that the abdomen was unusually large; the child vomited green mucous material, and refused to nurse at the breast. The vomiting continued, and became stercoraceous on the second day; there had been no movement of the bowels; intestinal obstruction was diagnosed, and the patient was submitted to operation. Littré's operation in the right groin was performed; a passage of bowel contents occurred. The child seemed comfortable all day after the operation, but the following morning suddenly became collapsed and died.

On post-mortem examination there were signs of peritonitis; at one point a thickened band of organized lymph extended from the stomach to the omentum, adhesions between adjacent portions of the bowels existing here and there. Extending from the stomach there were two feet of intestine of normal calibre; this ended below in a *cul-de-sac*. From the rectum there extended up a portion of intestine, three feet in length, of normal calibre; beyond this, and connecting it with the normal bowel above, was a portion of intestine not thicker than a lead-pencil; it seemed solid, but on examination was found to have a very small lumen.

In the peritonitis occurring in the newly-born, Smith<sup>1</sup><sub>Dec. 13, '90</sub> con-

siders that microbes play an important part, the septic matter no doubt entering the peritoneum through the umbilicus. There is no doubt that many diseases formerly supposed to be due to cold were due to microbes, though probably there is now too great a tendency to ignore thermal changes as a cause of disease. Scarcely any disease requires more urgent, early, and judicious treatment; and the selection of a proper diet is paramount, sterilized milk being considered by far the best, to which, for older children, some farinaceous food may be added.

*Treatment.*—J. J. Reid <sup>51</sup><sub>Jan.</sub> reports the case of a girl 5 years of age who had diarrhœa, tympanites, and abdominal tenderness, followed by dullness, and later great distension resembling ascites. Rupture at the umbilicus suddenly took place, and pus flowed freely from the opening. The peritoneum was washed out twice with warm water, and the child recovered in a short time.

Kirmisson <sup>2</sup><sub>Sup., Sept. 12</sub> reported the case of a girl aged 3 years who had been suffering for some months from tuberculous peritonitis with ascites. After a first tapping, which was followed by fresh effusion of fluid, laparotomy was performed, and abundant tuberculous granulations were found, both on the visceral and parietal peritoneum. After washing out the peritoneal cavity it was closed, and from the surgical point of view the case did well; but in a few days effusion again took place. Injections of dogs' serum were then tried and the ascites soon disappeared, and with it every trace of induration in the abdomen. Pinard said that he had injected dogs' serum into 2 children, prematurely born of mothers in the last stage of tuberculous cachexia, who died within a few days of their confinement. He was unable to keep the children under observation long enough to allow of any conclusions being drawn as to the result of the treatment on tuberculosis, but he was so much struck by the immediate effect of the injections on the general condition that he began to inject dogs' serum into all newborn infants weighing less than 2 kilogrammes (about 4 pounds), whether of tuberculous stock or not. The results obtained in 17 cases thus treated have been so satisfactory that he strongly recommends the method as a valuable adjuvant to other measures, such as the use of the couveuse, etc., in the case of all newborn infants suffering from congenital weakness.

In the treatment of peritonitis Eichberg <sup>9</sup><sub>Dec. 13, '90</sub> urges the value

of the old form, viz., opium to narcosis, combined with minute doses of calomel, and, as a local application, the free use of mercurial ointment over the abdomen twice daily.

Byford, of New York, <sup>59</sup><sub>May 9</sub> says that he has not derived the satisfaction from the saline treatment of peritonitis that he had been led to expect. In 2 or 3 cases it seemed to increase the extent of the peritonitis, and complicated convalescence by inducing irritability of the stomach and bowels. In severe septic cases it was utterly useless. In tympanites laxative enemata often act more promptly and efficiently; but in ordinary cases, with a tendency to intestinal paralysis and perverted secretions, it acted charmingly, and is a valuable addition to the after-treatment of abdominal section.

#### CHYLOUS ASCITES.

Mollin <sup>230</sup><sub>Nov., '90</sub> reports a case of chylous ascites occurring suddenly in a woman of previous good health. In a few months the abdomen enlarged to such proportions that she was tapped to relieve the oppression occasioned. At the first operation 6 litres (6 quarts) of a milky fluid resembling an emulsion were drawn. A month later 7 litres (7 quarts) of exactly the same appearance were removed. The spleen was found, on physical examination, to be twice its normal size. All the other organs were apparently healthy. He gives the various theories advanced as to the etiology of this condition, but does not assign any particular cause in this case. Fred. J. Smith <sup>6</sup><sub>Jan. 10</sub> reports a case of chylous ascites in a woman 60 years of age, the only symptoms being dyspepsia and later the ascites. The necropsy showed primary cancerous growths in both broad ligaments, chronic peritonitis with small nodules of new growth, and two large stones occluding the cystic duct. He attributed the death to a simple, non-malignant, chronic peritonitis, basing his belief on (1) the comparative numerical deficiency of the neoplastic nodules; (2) the verified presence of a simple irritant; (3) the long duration of the disease. A case of miliary carcinoma of the peritoneum resulting in chylous ascites is reported by Curwen. <sup>2</sup><sub>Sept. 12</sub> These growths being scattered all over the peritoneum gave rise to much chronic inflammation, and consequent thickening and contraction of the serous and subserous tissue. The changes were most marked in the mesentery, and it was by its contraction and crumpling that the lacteals were

pressed upon and the passage of chyle prevented. This fluid, being no longer able to pass along its natural channels, must have been poured out into the abdominal cavity by apertures which were not demonstrable post-mortem.

#### SPECIFIC DISEASE OF INTESTINES.

Rieder<sup>147</sup><sub>July</sub> has noted, in 11 cases of specific disease of the intestines in acquired syphilis, the following points: 1. The seat of the lesions is in the small intestine, and especially in its upper section. 2. The lesions are arranged in pairs or in groups. 3. The lesions tend to form a ring within the lumen of the canal, the plaques of the disease being strongly marked; the surrounding tissues are swollen, causing increased thickening of the intestinal walls, and especially an increase in the muscle-layer. 4. The results often produce a stenosis, and, later, atrophy of the intestinal walls. The histological structure shows, in the early stage, an increase in connective tissue,—at first in the submucosa, later in all the coats of the intestine.

#### TUMORS OF INTESTINES.

Matiguor<sup>188</sup><sub>Dec. 24, '90</sub> reports a case of primary cancer of the colon in which the digestive process continued normal without hæmorrhage. Zuelzer<sup>245</sup><sub>Jan.</sub> recommends the method of combined percussion and auscultation for the examination of the kidneys or of abdominal tumors covered with a thick layer of muscles. Differences in sound incapable of recognition by ordinary percussion can thus be determined. A metallic, vibrating sound is given by organs containing air, such as lungs and intestines. If we percuss over a solid organ,—such as the heart, liver, kidneys,—or over the muscles or tumors, or, better still, if we percuss below the solid mass and auscultate above the opposite margin, a considerable interference with the sound conduction or dullness is appreciated. We can in this way map out the borders of the organ or tumor with the greatest accuracy. To make out the boundaries of the bladder when filled with urine, it is sufficient to apply the stethoscope over an air-containing area above the bladder. In examinations of the kidney it is necessary to determine the external and inferior borders, and demonstrate whether dullness is produced by its presence. For this purpose the intestines should be as empty as possible; the stethoscope is placed upon the anterior abdominal

wall, and percussion practiced over the corresponding renal area; the patient bends slightly forward, supporting himself with his hands upon the seat of a chair. The percussion is commenced at the level of the fifth or sixth lumbar vertebra, over the spinous process, the bone yielding a clear resonance, and is continued toward the outside. Where the kidney is covered by the muscles of the back the percussion dullness is most intense; it becomes distinctly clearer, however, as soon as we percuss beyond the margin of the organ.

#### ABDOMINAL ABSCESS.

Weisz<sup>2</sup><sub>Sup., Apr. 25</sub> attended a nurse, aged about 32, who suffered from hypogastric pains and fever. A wide fluctuating area was detected in the ileo-cæcal region. It was painful, and the integuments were of a dusky-red color. It was diagnosed as abscess of the abdominal wall. On incision a great quantity of bloody pus came away; a probe, passed deeply, caused the escape of fæcal-smelling matter, thought at the time to be contents of the intestine. Hence, Weisz diagnosed *anus præternaturalis* arising from inflammation in the neighborhood of the cæcum. In two days, however, the abscess-cavity contracted greatly, and healthy, odorless pus escaped. Recovery was rapid. There were no morbid conditions in relation to the fæces or action of the bowels. Hence, it would appear that the abscess was not of perityphlitic origin, but simply a collection of pus limited from the first to the abdominal wall. The fæcal odor was simply due to diffusion of gases, originating in the intestine, through the abscess-wall.

#### LEAD COLIC.

M. M. Bowlan<sup>6</sup><sub>May</sub> reports a case of lead colic, in which the blue-gum line was absent, due to frequent cleansing of the teeth with a common salt solution. The gum sign is admitted to be generally present in chronic plumbism, and also in white-lead workers who have been exposed for any length of time, even though no toxic symptoms have developed. This case has some bearing on the proximate cause of the "blue line"; for, if local cleanliness prevent its formation, it must be either by removing or neutralizing some factor or factors essential to its production. Now, the generally received opinion appears to be that the lead is excreted by the vessels of the papillæ of the gums (probably as a complex albuminate), and that it is here precipitated as a sulphide

by the  $H_2G$  evolved in the decomposition of animal matters contained in the pores of the tartar on the teeth; and it is reasonable that local cleanliness should, by preventing the accumulation of tartar and the stagnation of the secretions and food detritus, hinder the formation of sulphides in the mouth. There can be no doubt that the saliva itself contains sufficient sulphur-charged proteid matter to generate, by decomposition, the required sulphide. But there is one other possible source of this sulphur without having to draw upon the disintegration of albuminoid bodies, viz., that we have always present in the mouth, as a constituent of healthy saliva, a compound sulphide-potassium sulpho-cyanide; and some 130 milligrammes (2 grains) of this are secreted daily. This salt in aqueous solution decomposes with the evolution of ammonia at ordinary temperatures. Watts makes no mention as to what becomes of the sulphur when a watery solution of KCNS thus breaks up, but it seems not improbable that it is a contributor, if not the actual source, of the sulphide which precipitates the lead in the gum. Doubtless microbes take part in this process of chemical change. From this stand-point the cleansing of the mouth prevents any discoloration of the gums by preventing the formation of that nidus for stagnant and decomposing animal matters and sulpho-cyanides,—the tartar of neglected teeth. These matters gain access to the tartar in two ways: (1) by being carried down with the lime-salts when the tartar is being deposited on the teeth; (2) by subsequent absorption into the pores of the tartar.

#### CHOLERA.

Gilbert and Girode<sup>14</sup><sub>Feb. 8</sub> describe the researches they have made in regard to some cases of cholera nostras. The chief interest lies in the bacteriological work. The stools in some of the cases yielded almost pure cultivations of Escherich's bacillus. Cultivations were also made from the fæces on different media, and numerous colonies were also obtained from the cerebro-spinal fluid, but not so many were yielded by the blood of the liver and spleen. The fluid squeezed from the lungs produced, in addition to the pathogenic bacteria, organisms morphologically similar to the pneumococcus. Although certain organic disturbances, such as high temperature, favored the development of the bacillus, as shown by the fact that when such occurred pure cultivations could be easily obtained from

the stools, the authors would not imply the reverse order of things,—that the high temperature, etc., was caused by the rapid multiplication of the organism; they considered that cholera nostras was not always a symptom of a local lesion of the intestine, and that the germs were able to pass through the walls of the intestine, invading the body, and so bringing about a new morbid type,—the infectious form of the disease. They were also of opinion that the bacillus of Escherich was not the only choleraic microbe in this climate. Finkler and Prior have also found a bacillus in the alvine evacuations of patients suffering from cholera nostras very similar to the cholera bacillus of Koch. There are two suppositions which may be considered as regards the connection of Escherich's bacillus with cholera nostras: in one the microbe may be concluded to be harmless before it enters the body, and may there develop its special pathogenic properties; the second idea supposes that the germs are widely distributed, and acquire their poisonous properties before entering the body, most probably doing so by means of drinking-water. In the guinea-pig, if a pure culture of this bacillus be injected, it is followed by all the symptoms of a typical attack of cholera nostras.

## MISCELLANEOUS.

Levison, of Copenhagen, corresponding editor, <sup>673</sup><sub>June</sub> states that Hirschsprung describes a new disease,—congenital enlargement and hypertrophy of the large intestine. He saw, some years ago, 2 cases of this anomaly, in which the post-mortem showed ulcerations in the enlarged bowel, probably caused by the diarrhœa from which the children had suffered. He now reports a new case: a child 3 days old was brought to the hospital because there had been no motions and the abdomen was enlarged; by enemata and evacuants motions could be provoked, but the child did not thrive, and died after two months. The post-mortem showed an enormous enlargement of the transverse colon, which reached to the region of the navel; flexura coli dextra and lienalis were somewhat retracted, while the colon ascendens, cæcum, and colon descendens were less enlarged than the transverse colon. The walls of the intestinum crassum, especially in the two flexuræ coli, were hypertrophied, both as to muscular stratum and mucous membrane. Ulcerations were not to be found. A similar case is still under observation.

# DISEASES OF THE DIGESTIVE ORGANS IN CHILDREN.

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THE contributions to this department during the past year were very numerous, but the number of new facts discovered and of new ideas advanced was unusually small. It cannot be said, however, that the year was barren of results. Numerous observations of former years have been confirmed by further investigations, and various points have been rendered more positive and exact. Upon pathology very little has been written, and our knowledge of etiology has been increased but little during the year. While no striking or radical change has been made in treatment, it is certain that more rational methods prevail and that treatment is becoming more efficient.

## DENTITION.

Brothers,<sup>1</sup><sub>May 30</sub> in observing a large number of cases, found the average age at which the first tooth appeared to be  $6\frac{1}{2}$  months. This, even in health, is subject to very wide variations. After long study upon the subject, he was convinced that the influence of teething has been much exaggerated, but he was not willing to join the ranks of those who denied it any place whatever. The teaching that moderate diarrhoea during the period of dentition is beneficial is pernicious, and has caused the death of many children. Jacobi<sup>23</sup><sub>June</sub> strongly opposes the idea that dentition bears any causal relationship to gastritis, fever, convulsions, or epilepsy.

Saint-Philippe,<sup>188</sup><sub>July 12</sub> while he does not consider dentition as an actual cause of diarrhoea, regards it as one of the factors which renders a child more susceptible to the noxious influence of the germs of the disease. The prevailing opinion seems to be, as stated last year, that dentition is a physiological process, subject in some instances to pathological conditions rarely of a serious nature.

(E-1)

## DIGESTION.

*Relations of the Abdominal Viscera in the Infant.*—In studying the diseases of the abdominal organs the relation of the various structures becomes of great importance. Ballantyne,<sup>36</sup> July in a lengthy article, reports extensive observations upon this subject. The liver is the organ that first attracts attention, for its great size accounts in large measure for most of the peculiarities in the anatomical relations of the abdominal viscera of the infant. The stomach is comparatively small, and is crowded to the left of the median line by the liver, which partially overlaps it. Though the fundus is somewhat smaller than in the adult, there is not sufficient peculiarity in shape to account for the readiness with which a child vomits. It is, perhaps, explained by the fact that the stomach is surrounded on all sides by hard and resisting organs. The small intestine is not peculiar in its relations. Its length varies somewhat in different cases, but is usually about nine feet at birth, and increases very rapidly during the first two months. The position of the cæcum varies, and the transverse colon is crowded out of position by the liver. The sigmoid flexure is long, and the loop lies to the right of the median line, and extends downward into the pelvis behind the bladder. The bladder in infancy is almost entirely an abdominal organ. The kidneys, spleen, and pancreas have the same relation to surrounding organs as in the adult.

*Physiology of Infantile Digestion.*—Clopatt<sup>152</sup> Apr. 3 affirms that, in children at the breast, the acidity of the gastric juice varies very little, differing not more than from 0.03 to 0.08 of 1 per cent. at the end of the first hour, and that gastric digestion is accomplished without the formation of free hydrochloric acid. In bottle-fed children absolute acidity is often more pronounced than in the breast-fed. At the end of the first hour there is frequently more than  $\frac{1}{10}$  of 1 per cent. of acid. Observations of this character are subject to so many sources of error that they must be accepted with great caution. Milk absorbs hydrochloric acid very rapidly, so that free acid does not appear until digestion has been nearly completed, as shown by Booker. Nothing has appeared to throw doubt upon his careful observations, reported in the ANNUAL of last year.

*Production of Hydrochloric Acid in the Stomach of Nursing Infants in Health and Disease.*—Wohlmann<sup>366</sup> Apr. 30 made observations upon 7 infants, which showed that, both in healthy and diseased

stomachs, the quantity of hydrochloric acid is increased by irrigations immediately preceding the taking of food. Another series of experiments, 10 in number, demonstrated the fact that the gastric juice in the interval between meals may be either neutral or acid, and, in the latter case, with or without the presence of free acid; therefore, only the gastric juice secreted during digestion is of importance in studying this question. In the case of healthy breast-fed infants free acid can be demonstrated quantitatively and qualitatively from one and one-fourth to two hours after feeding, the maximum amount being from 0.08 per cent. to 0.18 per cent. In acute and chronic dyspepsia and gastro-enteritis no free acid was ever found within two hours, unless the amount of food taken was very much below the normal for the child's age and weight. In acute dyspepsia irrigation was followed by a rapid increase in the quantity of hydrochloric acid, while in chronic dyspepsia no free acid could ever be demonstrated during the entire stage of breast-milk digestion.

Infants suffering from gastro-enteritis retained quantities of milk three hours after nursing, and litmus-paper showed only a faintly acid reaction after two hours; thus proving how small was the quantity of acid secreted during this disease. A series of experiments upon premature infants convinced Wohlmann that when they were nursed at two-hour intervals the quantity of acid secreted never reached an amount sufficient for quantitative tests. When the nursing interval was three hours, it was evident that these infants, like full-term children suffering from dyspepsia, needed a longer time to produce free hydrochloric acid, then being only 0.9 per cent. after two and three-quarter hours. In view of this slowness of digestion in premature infants, it is deemed essential that the intervals of feeding should never be shorter than three hours. When tea or egg-water was given hydrochloric acid was often absent altogether, but in other cases free acid appeared much earlier than after milk feeding.

*Capacity of the Stomach in Infancy.*—No new observations upon this subject have been reported during the year, but the influence of the work of former years is distinctly shown in the smaller amounts of food now generally advised for each feeding. Upon this point the unanimity of opinion is quite marked. Extensive observations were reported last year, the conclusion being

that, approximately, at birth, three, six, nine, and fourteen months, the capacity of the stomach is, respectively, 1,  $4\frac{1}{2}$ , 6, and 9 ounces (31, 140, 187, 280 grammes).

#### DILATATION OF THE STOMACH.

Henschel<sup>158</sup><sub>B.13,B.1.2</sub> believes that dilatation may be regular or irregular ("hour-glass") in form, and causes thinning of the walls of the stomach, and, later on, fatty degeneration and atrophy of the muscular coats. The mucous membrane may be anæmic or hyperanæmic, according to the catarrhal conditions present.

*Etiology.*—Dilatation may be due to mechanical causes, the most prominent of which are congenital stenosis of the pylorus and overfeeding. It also may depend upon muscular atony; this may be of constitutional origin, being due to scrofula, rachitis, syphilis, or malaria; or it may depend upon abnormal fermentation, either in acute or chronic gastro-intestinal catarrh. Four cases of dilatation due to congenital stenosis of the pylorus are reported, all occurring in one family. The first was a classical case, dying at 2 years, the diagnosis being verified by an autopsy. The second case died at 7 months, with very similar symptoms, but no autopsy was made. The third child showed the same symptoms, but improved, under irrigation and careful diet, so that at the age of 25 months, although rachitic, he was in a very fair condition. The fourth child died of tuberculosis at  $5\frac{1}{2}$  months; the autopsy revealed a collapsed, "hour-glass" stomach. The only case which came under observation, depending apparently upon congenital syphilis, gave no gastric symptoms during life, although the autopsy showed great dilatation, the lower border of the stomach reaching to the umbilicus, the mucous membrane being anæmic and atrophic. By far the largest number of cases of dilatation of the stomach were due to abnormal fermentation, the chronic cases being the most severe. Three examples are reported.

*Symptoms.*—In congenital stenosis the vomiting and evident pain begin when the first meal is taken, and vomiting is persistent. Constipation or flatulence and progressive emaciation follow, with death, in a short time, from inanition. When cases depend upon overfeeding or constitutional causes the symptoms are slower in their course, beginning with slight disturbance of digestion,—such

as occasional vomiting and loss of appetite,—until later nothing may be tolerated by the stomach. The other symptoms are those of chronic indigestion,—whatever its cause,—and the child usually dies from the intercurrent of some acute attack of gastro-enteritis. The cases depending upon fermentation are more rapid than the class last mentioned, the local symptoms being generally obscured by the severe general symptoms of the primary disease. Of the physical signs, the most characteristic are the tympanitic percussion note in determining the outline and the succession sound. It is to be borne in mind that the latter may be produced in the intestines, and hence be of no positive diagnostic value.

The *prognosis* in dilatation of the stomach depends upon the cause, and only when due to pyloric stenosis is it absolutely bad.

In *treatment* the author relies, first, upon carefully regulated diet,—especially the avoidance of starchy foods,—and, secondly, upon daily irrigation of the stomach with warm water or weak solutions of boracic acid or benzoate of soda.

It seems to the senior editor that some of the author's conclusions should not be accepted without qualification. The editor has personally made a very large number of observations upon the size of the stomach, and he is convinced that many of the various shapes found at autopsies are usually due to contraction of the muscular coats,—the patient dying when the stomach was empty, or nearly so. “Hour-glass” contraction, occurring under such circumstances, is not at all uncommon, and is certainly without pathological significance.

#### DIARRHOEAL DISEASES.

*Nomenclature.*—Intelligent work upon this subject is still greatly impeded by confusion in nomenclature. Many excellent articles are diminished in value or rendered actually worthless by the indiscriminate use of the terms “cholera infantum,” “enteritis,” and other indefinite expressions, rendering it impossible to determine the form of disease to which the author refers. The term “cholera infantum” is the one most frequently used incorrectly. It is limited by nearly every author of prominence to cases characterized by large, serous stools, accompanied by profuse vomiting, high temperature, prostration, and marked nervous symptoms. If writers for the journals would observe the same rule it would

save much confusion, and render their work of decidedly more value.

*Etiology.*—Owing to the strong evidence recently presented of the bacterial origin of most cases of summer diarrhoea, there is a tendency in this, as in other diseases, to attribute too much to the direct action of micro-organisms, and to ignore many conditions which are also concerned in the production of the disease. Germs flourish only under favorable conditions, the most favorable of which is an undigested and decomposing fluid mass in the stomach and intestines. Hence, indigestible food, overfeeding, by leaving an undigested residue, or anything which diminishes the digestive power, is a predisposing cause of the disease. While the germs are the active and actual cause of the more severe forms of summer diarrhoea, we cannot safely ignore these predisposing causes, discovered long ago by clinical observation. There seems to be such a tendency, however, in certain recent articles,—a tendency to the belief that the discovery of germs destroyed all our previous knowledge and ideas of disease. As a matter of fact, the discovery of germs, while adding much, has destroyed but little. It readily explains why certain conditions already known to be predisposing causes are such. The germ is the last link in the chain, and renders our knowledge exact and positive where it was before uncertain and theoretical. In addition to the administration of drugs, and the exclusion from the body and the destruction of germs, we have learned the importance of giving greater attention to the general dietetic and hygienic management of our cases.

Hue, of Rouen, <sup>203</sup><sub>June 1</sub> reports some interesting observations, made during a severe epidemic of cholera infantum, in a ward containing no child over 10 days old. No breast-fed child was ill, the victims all being among those fed on cows' milk. This milk was obtained from two cows, well cared for, and every care was taken of the various vessels in which the milk was placed. The disease began in from one to four days after birth, and was very fatal, death occurring in from twenty-four to forty-eight hours. The milk was first boiled, without effect upon the epidemic. It was then sterilized, the ward was cleared and thoroughly cleaned, and the walls washed down, when the epidemic at once ceased. Lactic acid was freely used, without any apparent result.

Saint-Philippe <sup>188</sup><sub>July 12</sub> calls attention to the close relationship ex-

isting between the intestinal canal and the skin, and believes that prolonged baths at too low temperature may be the cause of digestive disturbances which may lead to diarrhoea.

Seiffert<sup>366</sup><sub>B.32.H.4</sub> has made quantitative bacteriological investigations upon the stomachs of living children to determine the relative number of bacteria present in health and disease; whether any relation exists between the number of organisms present and the severity of the disease; and whether there was any relation between numbers and severity on the one hand, and the factors determining decomposition of milk (particularly temperature) on the other. From 22 observations, the following conclusions are drawn: (1) the spores present in acute dyspepsia and introduced with the food will grow luxuriantly at the body temperature, and these are capable of withstanding the action of the acids of the stomach; (2) since severe dyspepsias, especially of the cholera-infantum type, present the phenomena of acute intoxication, and increase in severity with the temperature of the atmosphere their cause is to be sought in the poisons generated by the saprophytic germs of the stomach and intestines; (3) some of these cases have the general characteristics of acute infectious diseases in their etiology, but the majority are not particularly endemic or epidemic, and the special characteristics of infectious diseases (stage of incubation, typical course, etc.) are rare.

Cahen<sup>69</sup><sub>July 21</sub> reports a case of dysentery, in a child 4 years old, in which careful microscopical examination of the stools was made. In the reddish-brown fluid stools which followed the administration of calomel and santonin amœbæ were found in every observation of a series extending over seventeen days. These bodies were identical with those described by Löschner, excepting in point of size, being only two or three times larger than red blood-globules, but in this particular agreeing with the description of Kartulis. No cultures were obtained, and an injection of the fluid containing them into the intestines of cats (*per rectum*) produced only thin stools without blood or amœbæ. The author examined other cases of dysentery, and found amœbæ in every one. They were, however, absent in all the other forms of intestinal diseases. In a child 6 months old, that was having ten or fifteen severe colicky attacks a day, accompanied by great tenesmus, and ending with a passage from the bowels containing considerable mucus, but no

faecal matter, microscopical examination showed the presence of a pear-shaped monad, with a nucleus near its broad end and a flagellum at its stem end. The symptoms yielded to injections of corrosive sublimate, and the monads disappeared from the intestines at the same time. Whether these bodies were the cause of the symptoms, or only an accidental occurrence, the author regards as a matter of doubt.

*Treatment—Diet.*—The prophylactic treatment of diarrhoea consists chiefly in the proper feeding of infants in health, and is virtually equivalent to the subject of infant feeding. In certain respects that subject is in a most peculiar condition, for writers seem to be far less positive regarding their ability to feed weak and delicate children than they were a few years ago. Theoretically, the difficulties have been largely overcome. A food can be prepared that, chemically, is almost identical with breast-milk. Sometimes it acts admirably, and sometimes it is entirely rejected. Blackader<sup>282 Aug.</sup> especially refers to the hopes that at least sufficient data was at hand to construct an ideal infant's food. A part of the failures he attributes to changes which take place in milk during the process of sterilizing. He believes that milk sterilized in the usual way is not as readily digested as plain milk, and that it possesses certain disadvantages which are not, however, as great as the disadvantages and dangers of milk swarming with bacteria. He proposes to obviate this by partial sterilizing, which is sufficient in most cases. When the Arnold sterilizer is used the process should be continued but twelve or fifteen minutes, cold water being placed in the pan at first. Leeds and Hiesland<sup>1 Nov. 7</sup> report the following changes as taking place in sterilized milk: 1. When the heat rises above 165° F. (73.9° C.) the galactozymose, or starch-liquefying ferment, is destroyed. It is present in cows' milk only in minute quantities. 2. A portion of the lactalbumen is coagulated. 3. The casein, after the action of prolonged heat, is less readily coagulated by rennet, and yields slowly and imperfectly to the action of pepsin and pancreatin. 4. Fat is so affected by the heat that, after the milk has stood for some time, small lumps collect on the surface. 5. Milk-sugar is completely destroyed by prolonged heating.

Soxhlet<sup>34 May 12, 19</sup> announces modifications in the sterilizer,—doing away with stoppers, substituting for them thin sheets of rubber to

be placed over the bottles; their light rubber disc permits the exit of gas set free during heating; upon cooling, the rubber is held in position by atmospheric pressure. He has not found sterilized milk the universal food so long sought, but, in common with Leeds and others, he has observed that in some cases fat is so emulsified by sterilization that the milk becomes less digestible. It should not be forgotten that sterilizing accomplishes but one thing,—the destruction of bacteria,—and it may render the milk less digestible. When fresh milk can be obtained, it should not be resorted to. When employed, the same rules must be observed regarding dilution and preparation as for unsterilized milk. Causade <sup>203</sup><sub>Aug.1</sub> refers to the care that should be observed in the handling and transporting of milk. It should be carried in full vessels, to prevent the churning action it would otherwise undergo, and should be kept scrupulously from the air. He believes that it should always be boiled when digestion is imperfect. As in former years, the use of milk in the more active stages of diarrhoea is disapproved by most writers, and, in the first stages, especially if the onset is sudden and severe, no food whatever is advised for many hours. Water may be given freely, unless there is excessive vomiting, or weak brandy and water, chicken-broth, or barley-water. When milk is begun it should be largely diluted, 1 part being used to 8 of water, the strength being gradually increased. Cream, well diluted, is sometimes tolerated better by the stomach than milk. Other foods commonly referred to are meat-broths, meat-juice, and white of egg. As regards the selection of foods, no rules have been formulated better than those reported in the ANNUAL of last year.

*Medicinal Treatment.*—The tendency noticed last year toward the use of fewer drugs and smaller doses still continues. The use of the stronger disinfectant drugs simply as disinfectants continues to decrease. Bismuth subnitrate holds its ground more firmly than any other drug, large doses being employed, at least 10 grains (0.65 gramme) every two hours at 1 year being advised. The salicylate of bismuth is but little used. Considerable has been written concerning arsenite of copper. The experience of most observers has not been fortunate. Little has been said of carbolic acid, resorcin, and naphthalin. Bichloride of mercury is still used, but probably much less than a few years ago. Many

journals have adopted the commendable habit of publishing, at the beginning of warm weather, an article, often editorial, upon the management and treatment of these diseases. They are undoubtedly productive of much good. They rarely contain anything original, but have been of interest to the editors of this department in showing the tendency of the profession in the practical, every-day management of the diarrhoeal diseases. Faith in drugs is unquestionably decreasing, while more reliance is placed in hygienic and dietetic measures. There is little tendency, however, among the more judicious members of the profession to abandon drugs entirely. Overdrugging, the most serious error commonly seen in the management of these cases, is probably less prevalent than in former years.

The general plans of treatment in ordinary cases of dyspeptic diarrhoea and acute enterocolitis, as described by various writers, while varying widely in details, are surprisingly similar. At the outset, even if the case is first seen after several days of illness, an evacuant is given. For this purpose rhubarb, a saline laxative, castor-oil, or calomel is commonly employed. Calomel is probably more generally selected than either of the other drugs. It is administered either at a single dose, or in divided doses, frequently repeated. By the latter method  $\frac{1}{10}$  or  $\frac{1}{6}$  grain (0.0065 or 0.011 gramme) is given every half-hour or every hour until 1 grain (0.97 gramme) has been used. Thoroughly triturated with sugar-of-milk and administered dry on the tongue, either as powder or compressed tablet, it will be retained and act efficiently when the stomach is too irritable to tolerate any other drug. By some the calomel is continued in the later stages, a minute dose being given several times a day. The evacuant is followed by bismuth, acids, alkalies, and, perhaps, an antiseptic. Opium is used by a majority of writers, and, when administered rationally, is an agent of the greatest value. It should not be used until decomposing matter has been removed from the alimentary canal. When the passages are small, infrequent, and of bad odor, it is decidedly contraindicated, and it should not be pushed to narcotism in any case. It should never be combined with the ordinary diarrhoea mixtures, which are usually given at short intervals, but should be administered alone, and at intervals varying with the symptoms.

Saint-Philippe<sup>188</sup><sub>July 12</sub> is one who denounces the use of opium,

even in small doses, and believes its effects are far worse than those of the diarrhœa. Others have written in equally strong terms against it. The majority of writers, however, who have used opium with proper discrimination, do not share these views.

Salol is commended by Moncorvo<sup>35</sup><sub>Jan. 7</sub> in the diarrhœa of marasmic children. It may be given in daily doses, varying from  $2\frac{1}{2}$  grains (0.16 gramme) to 20 or 30 grains (1.30 to 1.94 grammes). Others have written disparagingly of the drug.

Several reports upon the action of lactic acid have been made during the year. Verdalle<sup>188</sup><sub>July 5</sub> has obtained excellent results from its use in green diarrhœa, while Saint-Philippe has found it of value in some cases, but, on the whole, uncertain and unreliable. Both used it according to Hayem's method. Venot<sup>188</sup><sub>July 5</sub> insists that its use should be restricted wholly to green diarrhœa, while Lefour insists, with equal positiveness, that the color is not a certain guide. Thomas<sup>197</sup><sub>Jan. 20</sub> speaks with favor of the drug in green diarrhœa, and also in cases of gastric dyspepsia without fever, characterized by vomiting, flatulence, and yellowish, fetid stools, containing undigested curds. He has met with the difficulty that has caused trouble to most physicians who have used the acid,—vomiting and the coagulation of the milk into solid curds. This is sure to occur if it is given immediately after meals.

Antipyretics find few advocates. A prolonged temperature, ranging so high as to demand antipyretic treatment, is met with in but a small proportion of cases. An attempt at reduction of temperature by sponging and by the removal of decomposing matter from the intestinal tract, and the prevention of further decomposition by irrigation, is far more rational than the administration of antipyretic drugs. Drug treatment is, in fact, referred to by very few writers. Harrington<sup>106</sup><sub>Aug.</sub> speaks highly of acetanilid. He employs it in doses of 2 to 4 grains (0.13 to 0.26 gramme) for children from 1 to 2 years of age, to be repeated every four hours, combined with a full dose of whisky.

Antipyrin has been proposed as a substitute for opium for the relief of pain and nervous symptoms, and is, no doubt, in some conditions, a drug of considerable value. Muselli<sup>188</sup><sub>July 5</sub> has used it in diarrhœal conditions, but has observed no constipating effects. Hirigoyen<sup>188</sup><sub>July 5</sub> has not been fortunate in its use, but Saint-Philippe<sup>188</sup><sub>July 5</sub> speaks of it in the highest terms. In suitable doses, he

has never seen it act badly, even in infants. Mackenzie<sup>192 July</sup> advises arsenic when the passages are large and greenish, the tongue clean, with a bluish hue, with incurved tip and edges. For hæmorrhages and bloody passages oil of turpentine is highly commended, especially by W. V. Wilson.<sup>2002 May 27</sup> He combines it with opium, and sometimes with bismuth. Sulphocarbolate of zinc is used by W. G. Stewart,<sup>760 Aug. 27</sup> in doses ranging from  $\frac{1}{4}$  grain (0.016 gramme) to 4 or 5 grains (0.26 to 0.32 gramme). It is a non-irritant, crystalline, astringent salt, and may be combined with bismuth and pepsin. It is claimed to act as an intestinal antiseptic, sedative to the stomach, antispasmodic, and astringent. The same author also speaks favorably of arsenite of copper.

Luff<sup>6 Dec. 20, '90</sup> considers the milk-ptomaine tyrotoxon as one of the chief factors in the causation of diarrhœa, and believes he has found, in biniodide of mercury, a drug which renders the ptomaine insoluble and inert. He claims the following decided advantages: (a) precipitation of tyrotoxon, by forming an insoluble double iodide (bichloride of mercury is powerless to precipitate the milk-ptomaine); (b) the biniodide is a much more powerful antiseptic than the bichloride; (c) it is a safer drug than the bichloride, and is more rapidly eliminated from the system. He prescribes it in the following form:—

R Liq. hydrarg. perchlor.,	.	.	12 minims (0.72 gramme).
Potassii iodidi,	.	.	$\frac{3}{4}$ grain (0.049 gramme).
Chloral hydratis,	.	.	1 grain (0.065 gramme).
Aquam,	.	ad	1 drachm (3.75 grammes).

This forms the teaspoonful dose, which, in the case of infants up to 6 months of age, may be given every four hours, and for infants from 6 to 12 months of age every three hours; children more than 1 year old may take two-teaspoonful doses. Every teaspoonful of the mixture contains  $\frac{1}{50}$  of a grain (0.0013 gramme) of biniodide of mercury. He employed it in 80 cases. The results, briefly stated, are as follow: In 72 of the 80 cases the diarrhœa ceased within two or three days; in 5 of the remaining 8 cases it ceased within four days; and in no case did it last over seven days.

For vomiting, creasote finds a number of active advocates. Harrington<sup>106 Aug.</sup> administers  $\frac{1}{8}$  of a drop, every thirty minutes, in water or elixir of pepsin. Wilson<sup>2002 May 27</sup> has the creasote triturated with bismuth and sugar of milk. He also commends a solution

of carbolie acid and lime-water as a most soothing combination, which quickly checks vomiting when there is fermentation of food. Fowler's solution is said to be serviceable in vomiting with profuse watery diarrhœa, the dose being very small.

*Mechanical Treatment.*—Stomach-washing and irrigation of the colon have received but little attention from writers during the year. The value of both procedures is too well established to admit the supposition that they are falling into disuse. Troitzky<sup>366</sup><sub>B.32,H.4</sub> lays down the following points: As a prophylactic measure, stomach-washing is useful in functional disturbances of stomach and intestines. The object is twofold: to remove the irritating contents, and to act as a stimulus to the gastric secretions. For these purposes plain warm water, used just before feeding, is sufficient. The irrigation may, however, be made with alkaline or acid solution, according to the conditions to be overcome in the individual cases. In inflammatory diseases of the stomach the severity of the onset can be diminished, but in later stages and in chronic cases this measure cannot be said to be curative.

Wohlmann<sup>366</sup><sub>B.32,H.3</sub> has observed that the effect of washing the stomach before feeding, whether in health or disease, was to increase the quantity of acid secreted during the subsequent digestion. Darrell<sup>43</sup><sub>Aug.</sub> treated 13 cases of diarrhœa with gastric disturbances by stomach-washing, 8 of which were cured without the use of drugs. Gibson<sup>647</sup><sub>July</sub> successfully washed the stomach of twins 12 days old, who had been born at 8 months, and weighed about 4 pounds.

#### INTESTINAL COLIC.

J. B. Johnson, of Washington,<sup>196</sup><sub>July</sub> believes the colic to which young infants are so subject to be in some instances neuralgic in character. As a rule, it arises from altered secretions of the intestinal canal, causing rapid formation of gas. The attacks occur at regular intervals, are always sudden in their onset, and continue for a variable time. Pain—as indicated by the cries of the child, drawing up of the legs, and other symptoms—is often extreme. The bowels are sometimes constipated, but more frequently loose, the evacuations being thin and frothy. Stimulants and opiates should be avoided. If the attacks are purely neuralgic in character cinchona is a valuable remedy. In other cases the author has had excellent results from the use of lactopeptine and subnitrate of bismuth;

1 grain (0.065 gramme) each is placed dry upon the tongue every hour until the child is quiet. Treatment should be continued several days.

## CONSTIPATION.

Durand <sup>1</sup><sub>Mar. 7</sub> reports a case of obstinate constipation, evidently cured in four days by gradual dilatation of the sphincter ani. As he also employed gentle massage of the abdomen and gave at the same time a mixture containing nux vomica and belladonna, the action of the dilatation for supposed undue contractility is somewhat uncertain.

# ANIMAL PARASITES AND THEIR EFFECTS.

By CHARLES S. DOLLEY, M.D.,

PHILADELPHIA.

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## GENERAL OBSERVATIONS.

A SENSE of the practical importance of a more accurate and widely diffused knowledge regarding human parasites seems gradually to be dawning upon the medical world. It is a fact for serious consideration that the average physician is sadly deficient in a practical knowledge of animal parasites and their effects. This is particularly the case as regards the parasitic protozoa, which, with the increase of skilled observers, will undoubtedly be found to be much more frequently the cause of disease than is now suspected.

The most important and interesting article of the year calling attention to this branch of medical knowledge is that read before the International Congress of Hygiene, by Prospero Sonsino, of Pisa, <sup>113</sup> Nos. 38 to 40; <sup>6</sup> Aug. 22 on "The Principal and Most Efficacious Means of Preventing the Spread of Entozoal Affections in Man."

Among the personal rules laid down are the following:—

Pure spring-water, boiled or filtered water, should alone be drunk. Drinking-water should be preserved in good and well-covered vessels. River- or lake- water should not be imbibed while bathing.

Meat, fresh-water fish, and vegetables should be well cooked, and kept from insects (flies). For children and invalids raw meat can be used, provided that it is well pounded and passed through a suitable sieve.

Depraved tastes for substances not possessed of alimentary qualities (pica and geophagia) should not be yielded to.

Special forms of food in use by the natives of countries possessing special entozoa should be avoided.

The body should be sedulously kept clear of epizoa (mosquitoes, bugs, fleas, etc.).

The following measures should be rendered obligatory by the boards of health of all countries where State action may be exercised in the cause of sanitation:—

The discharge of sewers, where possible, should be into the sea. When this is not practicable, the disinfection, at least of fæces, of such institutions as hospitals, asylums, and schools should be insisted upon.

Nuisances, especially in certain places of labor,—as brick-fields, mines, tunnels, railway embankments, digging of canals, rice-plantations,—should be prohibited, and provision made of latrines and tanks.

Daily veterinary inspection in the slaughter-houses (for trichina and measles especially) should be made.

Cremation of all organs or parts of organs of slaughtered animals offering or containing entozoa.

Facilities for admission into the hospitals should be afforded to the patients suffering from entozoal maladies in order to cure them.

Pigs should be inclosed, so that they may not have access to human ordure or to mice infected by trichina.

The general destruction of ownerless dogs and their removal from slaughter-houses should be insisted upon.

Latrines should be provided not only in towns, but also throughout the country, along the roads,—even far from dwelling-places.

J. Drivon, of Lyons,<sup>211</sup><sub>Nos. 38 to 41</sub> points out some interesting facts regarding the dispersion of certain parasites,—for example, the chigoe, originating in America, has been introduced into Africa, and spread gradually throughout the entire extent of that continent. The cestode larva (*Ligula simplicissima*) has spread throughout Europe as a parasite of the body-cavity of numerous fresh-water fishes, being so common in certain localities of France and Italy as to be utilized as food, under the name “*macaroni piatti*,” or “*vers blancs*.” This larval tape-worm has totally destroyed the carp of many French ponds; in fact, the carp seem to be universally affected with it. Its adult stage is found in fish-eating and aquatic birds. More recently, a parasitic disease has practically destroyed all the cray-fish about Lyons, while a similar disease, caused by *Distomum cirrigerum*, has produced like effect in certain parts of Germany.

To cover the cases of patients who attribute gastric and intestinal derangements to the presence of some living creature—snake, lizard, worm, or what not—which they have swallowed, Drivon proposes the term *helminthophobia*.

Drivon gives the statistics of helminthiasis in the hospitals of Lyons. As a result of 150 autopsies, he shows helminthiasis to have existed in 77.02 per cent.

As regards the frequency of parasites at different ages, he gives the following table:—

Helminthiasis.				Helminthiasis Absent.	
2 of 12 and 20 days . . . . .	2	100.00 per cent.		2	100.00 per cent.
10 under 2 years . . . . .	2	20.00 per cent.		8	80.00 “
14 from 2 to 10 years . . . . .	13	92.85 “		1	7.14 “
8 from 2 to 20 years . . . . .	8	100.00 “		1	7.14 “
14 from 20 to 30 years . . . . .	13	92.85 “		1	7.14 “
18 from 30 to 40 years . . . . .	16	88.88 “		2	11.11 “
18 from 40 to 50 years . . . . .	11	61.11 “		7	38.88 “
27 from 50 to 60 years . . . . .	23	85.18 “		4	14.81 “
16 from 60 to 70 years . . . . .	10	62.50 “		6	37.50 “
17 from 70 to 80 years . . . . .	15	88.23 “		2	11.76 “
6 over 80 years . . . . .	3	50.00 “		3	50.00 “

The following table indicates the frequency of parasites at the various seasons of the year. During the winter months the embryos develop with difficulty in water of low temperature, and during these months there are fewer raw vegetables and fruits consumed.

Helminths, . . . . .	Winter, 60.00 per cent.
Helminths, . . . . .	Spring, 81.66 “
Helminths, . . . . .	Summer, 82.35 “
Helminths, . . . . .	Autumn, 87.50 “

Special stress is placed upon the fact that the vicinity of Lyons gives results contrary to the generally expressed opinion that ascaris is the most common entozoön. Out of 148 autopsies, 110 (or 74.32 per cent.) showed the presence of trichocephalus, the total number of cases of helminthiasis being 77.02 per cent. The following statistics show that, while this parasite varies in abundance in different regions, it is still very common; and it would be interesting if some attention were given to the subject by American physicians. Bellingham, of Dublin, found trichocephalus in 81 cases out of 90, or 90 out of 100; Cooper, of Greenwich, 11 out of 16; Thibault, of Naples, 80 out of 80 cases. The reports from Germany show: At Dresden, 50 cases out of

1939, or 2.5 per cent.; at Erlangen, 195 out of 1755, or 11.11 per cent.; at Kiel, 185 out of 611, or 30.6 per cent.; at Munich, 185 out of 611.

*Trichinosis* appears to be very rare in France, never having been recorded for Lyons, although it was in Lyons, in 1880, that Leclerc first pointed out the presence of trichina in American lard. Similar observations in Paris and Havre led to the interdiction of American pork. Two cases of trichinosis are recorded for Paris, 1 for Strasbourg, and a small epidemic, in 1878, at Crépyen-Valois, where Laboulbène determined the presence of trichina in 17 persons out of 22 taken ill from eating pork infested with the parasites. Drivon fears that if the assertions are true that American pork reaches France *via* England and Germany, France may yet be driven to the necessity of supporting an army of 20,000 microscopists as inspectors of pork. He quotes 21,117 as the number of such inspectors in Prussia alone in 1885.

This valuable contribution to the statistics of helminthology is summed up as follows: 1. Parasitism is extremely frequent in the hospital population of Lyons and vicinity, making, as it does, after leaving out of consideration all protozoan, certain nematodes, and epizotic parasites, over 77 per cent. 2. Trematodes absent in region of Lyons. 3. *Tænia solium*, very rare. 4. *Tænia saginata*, or *Tænia medio-canellata*, not very frequent, but becoming more so of late years. 5. *Bothriocephalus*, autochthonous for the region of Lyons. 6. Hydatids, not rare; other species of *tænia* not found. 7. *Ascaris* common among the country people, but rather rare among town people. 8. *Oxyuris*, frequent in children and also in old people, but generally in the latter in small numbers, and giving rise to no symptoms whatever. 9. *Eustrongylus*, not very rare in dogs, and hence, probably, to be met with in men. 10. *Anchylostomum*, absent. 11. *Trichocephalus*, found in three-fourths of all autopsies of patients, but always having passed unperceived in life. 12. *Trichinosis*, absent. 13. *Echinorynchus* not sought for up to the present time.

A new publication devoted especially to helminthology is edited by Ch. Huber, of Munich<sup>1021</sup>; a carefully classified bibliography of zoölogy, and is accompanied by short reviews of the more important articles.

## PROTOZOAN PARASITES.

*Infusoria*.—K. Ortmann <sup>4</sup> <sub>Aug. 17</sub> <sup>2</sup> <sub>Sept. 19</sub> publishes a case of chronic catarrh of the large intestine associated with the holotrichous, infusorian parasite, *Balantidium coli*. Notwithstanding the doubt expressed by Leuckart and others as to the pathological import of this as well as other intestinal protozoans, it is a significant fact that Ortmann found that the number of the parasites and the severity of the diarrhœa ran a *pari passu* course. Various experiments were made, in order to discover what drugs would kill the balantidium outside the body, quinine being found one of the most efficacious. Applied in the form of clysters, this drug appeared beneficial, although it was not until it was given *per os* as well as *per rectum* that the diarrhœa was wholly checked and that the patient's general condition improved.

## CESTODES—TAPE-WORMS.

*Bothriocephalus latus*.—The increasing attention given by physicians to parasitology tends to prove that many parasitic worms hitherto supposed to be limited to narrow geographical areas are in reality quite widely dispersed. The observation of Kerbert, in Holland, and Fisket, in Belgium, noted in previous numbers of the ANNUAL, are this year followed by those of Drivon, <sup>211</sup> <sub>Sept. 27</sub> of Lyons, who, after recording 2 cases, is inclined to consider *Bothriocephalus latus* as an autochthon of France, at least in the vicinity of Lyons. An examination of recorded cases shows the observed distribution up to date to be as follows: West Russia (15 per cent. of population), Germany, Denmark, Holland, Belgium, Switzerland, Italy, France, and Japan.

The spread of *Bothriocephalus latus* over Western Europe corresponds with that of *Tænia saginata* (see ANNUAL, 1889, vol. i, F-2), and in all probability autochthonic cases will soon be reported for Spain and Great Britain. Cases are already known to have occurred in London. <sup>2108</sup> <sub>p. 78</sub> From the eggs of *Bothriocephalus latus* are hatched ciliated larvæ. These, becoming diffused throughout fresh-water lakes and streams, are probably eaten by some invertebrate (as yet unknown,—but probable, since feeding experiments made with their larvæ on pike, burbot, etc., failed to produce young bothriocephali). This first intermediate invertebrate host in its turn becomes the prey of some fish. Leuckart, in 1886,

writes: "We have already seen that the pike (*Esox lucius*) and the burbot (*Lota vulgaris*) have been proved to transfer the bothriocephalus; this, however, by no means excludes the possibility that other species, perhaps even some of the most favorite edible fish, may yet be proved equally dangerous." This prediction has come true, and at the present writing the following fish,—twelve species,—belonging to five distinct families, have been proven to act as intermediate hosts of the parasite: *Esox lucius*, pike, le brochet, hecht; *Lota vulgaris*, burbot, la lotte, quappe; *Perca fluviatilis*, perch, perche, flussbarsch; *Tinea vulgaris*, tench, tanche, schleiche; *Salmo salvelinus*, Welsh char, ombre chevalier, saibling; *Salmo umbla*; *Trutta vulgaris*, lachse; *Trutta lacustris*, sea-trout, see-forelle; *Onchorynchus perriji* (Japan), salmon; *Osmerus eperlanus*, smelt, eperlan, gemeiner stint; *Coregonus fera*, white-fish, féru, weissfelchen; *Thymallus vulgaris*, grayling, ombre, brandäschen.

The bothriocephalus larvæ, in its first stage having been eaten by a fish, takes on the second stage, wanders into the tissues, and becomes encapsuled not only in the most varied positions in the viscera, but also in the muscles. This second stage, called by Braun *pterocercus*, may be very abundant in its host. When at Dorpat 79 out of 80 pike were found to be infected. These encapsuled larvæ have been proven to possess great power of resistance to extremes of heat and cold, and to remain alive in smoked fish. The gradual spread of *Bothriocephalus latus* over Europe seems attributable to the habit of emptying sewage into fresh-water streams and lakes. Thus, the Lake of Starnberg, which supplies fish to Munich, seems to have become infected about 1879 by tourists who had resided for some time near the Lake of Geneva. It is suggested, on the other hand, that the marked diminution in the number of cases of *Bothriocephalus latus* in Switzerland may be due to the increased utilization of sewage and fæcal matters from cess-pools as farm fertilizers. European emigrants and returning tourists are as likely to bring and dispense in British and American waters the eggs of this parasite as that such transference should have taken place from Switzerland to Bavaria, and also to the Italian lakes and French rivers. It is reported<sup>9</sup><sub>July 11</sub> that the trout of Loch Katrine are infected. It is advisable, therefore, that British and American physicians, especially those connected with large hospitals, almshouses, and pauper and

criminal institutions, should keep a sharp lookout for the eggs of *Bothriocephalus latus*; that they should be versed in the knowledge of the life-history and existence of these parasites, and in every possible way should physicians particularly discourage the utilization for drinking purposes of water infected with human excrement, as is undoubtedly that of Philadelphia and many other cities, and to encourage such systems of sewage utilization as are in use in Manchester, England, and other places. The citizens of Glasgow glory in their matchless water-supply, taken from Loch Katrine, but they are subject to periodical scares regarding alleged dangers from its use. The latest danger,<sup>9 July 11</sup> is a peculiar one, viz., that the trout of the lake are infested with tape-worms. J. B. Russell, the medical officer of health, and Prof. Young admit the fact of the trout being infested as stated, but deprecate the idea of there being any reason for alarm in the fact.

*Tænia saginata*.—W. H. Gray, of Chesterton, Ind.,<sup>199 Nov.</sup> records what he calls “a singular case of tape-worms.” Having inquired into the history of the patient, he “prescribed for her for a tape-worm,” and, “to my great astonishment and surprise, brought away 3 distinct tape-worms, measuring about thirty feet each and of the same length and size. Has any of the medical fraternity ever had a similar case?” Gray does not designate the species of worm to which he refers, but, judging from his expression of surprise, it was probably *Tænia saginata*, inasmuch as this worm does occur, as a rule, singly,—whence its title of solitary worm (*ver solitaire*); but with what impropriety, may be judged by the following: In a communication made to the Société Médicale des Hôpitaux,<sup>100 June 23</sup> Du Cazal reports a case of evacuation by a patient of his of 25 tape-worms (*Tænia saginata*) at one time. Du Cazal gives the following references, showing that his case is one among few, and exceeded only by 2 recorded cases: Laboulbène,<sup>420 76</sup> 16; Laveran,<sup>243 86</sup> 22; Richard,<sup>420 81</sup> 27; Gervais and Beneden, 41.

Joseph Coats<sup>213 Feb.</sup> describes a specimen of the prismatic variety of *Tænia saginata*, obtained for him by Temple, of Comrie. Coats’s proposition that this should be considered as a regular variety of *T. saginata*, rather than a malformation, would lead to amusing additions to zoölogical nomenclature if carried out for double monsters, as seen among vertebrates. At the Medical

Society of Lyons, <sup>211</sup><sub>Sept. 27</sub> to the inquiry as to whether the special colorations exhibited by certain *tænias* might be attributed to the administration of lead or mercury to the host (see ANNUAL, 1891, F-4) Drivon replied negatively, and presented two *tænias*, expelled at one time by the same patient, one being white and the other gray, the differences being independent of all metallic coloration.

To the short list—not over 12—of cases in which an entire *tænia* has been vomited <sup>2109</sup><sub>p. 100</sub> is added another by Bernard, of Lille, who reports the case of Renaud, of Harfleur, whose patient, a young woman of 19 years, while in perfectly good health, became nauseated and faint from sitting in a room full of tobacco-smoke. The next morning when vomiting, she threw off a tape-worm (*Tænia saginata*) over three metres in length. There was apparently no chance for fraud in this case, and the entrance of the worm into the stomach is accounted for by the relaxed condition of the pylorus and the reversed peristalsis produced by the warm air and tobacco-smoke.

*Tænia nana* (*Dwarf Tape-Worm*).—This parasite seems, like *Bothriocephalus latus*, to be gradually spreading over Europe; perhaps it is owing to more careful observation on the part of physicians that this minute tape-worm is more frequently detected. Mikhaïl S. Afanasieff, of St. Petersburg, <sup>2110</sup><sub>v. 2, p. 178; Sept. 26</sub> has recently published a case in a young soldier, who was admitted to the Nikolai-evsky Voiënnyi Hospital on account of some vague gastro-intestinal disturbances, cardiac palpitations (resembling those occurring in Graves's disease), and a train of other obscure nerve-symptoms. A microscopical examination of the patient's fæces revealed the characteristic ova of *Tænia nana*. According to the author's description, "the dwarf tape-worm's eggs have an ovoid shape, and measure from 43 to 53 micromillimetres in length and from 32 to 40 micromillimetres in breadth. The embryo is 35 micromillimetres long and 25 micromillimetres broad, its hooklets (up to 6 in number) measuring 10 micromillimetres in length. The ovum-shell is fairly thick, translucent, whitish, and homogeneous. The embryo's body is granular, and shows a couple of filaments at one of its poles." Immediately after the discovery of the eggs an anthelmintic remedy was administered, the result being that all the morbid phenomena vanished as soon as the worms had been ex-

pelled. This seems to be the first recorded case of *Tænia nana* in an adult.

Drivon<sup>211</sup><sub>No.39</sub> records a case in France, in a girl from Marseilles, and Sonsino<sup>900</sup><sub>May 15</sub> 3 cases in Pisa. The latter concludes, from the fact that he has found the eggs of *Tænia nana* in no less than 150 microscopical examinations in the last two years, that this parasite is not so rare as is generally supposed. Perroncito<sup>589</sup><sub>June 6</sub> calls attention to the cerebral nervous symptoms accompanying this form of helminthiasis, and previously noted by himself and by Grassi and Comini, and which cease immediately after the expulsion of the parasites. In all cases of nervous (choreic, epileptiform) symptoms in children a microscopical examination of the fæces should be made (see ANNUAL, 1888, vol. i, p. 380).

*Echinococcus*.—Hermann Vierordt<sup>133</sup><sub>June 4</sub> gives a careful review of all the known cases (20) of cystic echinococci which have occurred in Würtemberg.

*Cysticercus*.—Andri Bergé<sup>7</sup><sub>No.12</sub> brought to the attention of the Société Anatomique a case of multiple cysticerci affecting the brain, the lungs, the heart, the liver, and the pancreas. On the surface of the emphysematous lungs were disseminated about a dozen hydatids of the size of cherry-pits. The hypertrophied heart contained several cysts,—one in a fleshy column of the left ventricle, others in the wall of the ventricle. The liver presented but one cyst. Imbedded in the substance of the pancreas were several cysticerci. The brain presented some 15 cysticerci, varying in size from that of a hemp-seed to that of a small olive, scattered about on the surface, in the fissures, and in the brain-substance itself, which did not seem at all altered by the presence of the cysts; glycosuria existed, however. The muscles, although not dissected, gave no sign of cysts before or after death. In the intestines was found a *Tænia solium* thirty centimetres in length. Osler, of Baltimore,<sup>764</sup><sub>Apr.</sub> reports a case of multiple cysticerci differing strikingly from the above in the distribution of the cysts. Seventy-four of the subcutaneous cysts, varying in size from a grain of fine shot to a very large pea, were counted in numerous parts of the body, chiefly upon the trunk, the largest being in the right axilla. Several of the more painful of the tumors were removed, and confirmed the diagnosis. The patient recovered.

*Tænicides*.—In looking over the various suggestions for the treatment of tape-worm in the medical press of 1891, I observe that pelletierine, koussou, and kamala are conspicuous for their absence. Combinations of croton-oil, chloroform, glycerin, and castor-oil, preceded by fasting, and emulsion of pumpkin-seeds, are recommended by several.<sup>186 121</sup> J. Hobart Egbert, of South-  
ampton, Mass.,<sup>176</sup> Nov. gives the following:—

R Ol. tiglii, . . . . .	Mj ( 0.065 gramme).
Ol. ricini, . . . . .	℥ss (18.75 grammes).
Chloroformi, . . . . .	℥xv ( 0.97 gramme).
Glycerinæ, . . . . .	℥ss (18.75 grammes).

M. Sig.: One dose, fasting and after a brisk cathartic.

Cocoa-nut each year finds one or two new advocates, W. R. Allison, of Good Hope, Ill.,<sup>149</sup> Nov., '90 being added to the number. F. H. Lutterloh, of New Mexico,<sup>186</sup> Feb. is responsible for the assertion that half of a large, ripe pineapple caused the evacuation of an entire worm. Thymol, recommended originally by Gampi (ANNUAL, 1890, F-12, and ANNUAL, 1891, F-7), is favored by E. B. Smith, of Detroit,<sup>185</sup> Apr. who administers 10-grain (0.65 gramme) doses every fifteen minutes, in milk, until twelve doses are given. Sonsino last year favored thymol as the best drug in the treatment of anchylostoma (ANNUAL, 1890, F-19). Naphthalin, strongly recommended (ANNUAL, 1890, F-9) by Engel for lumbricoids, is now claimed as the best agent for expelling tænia. Merovitch, of Biélsk,<sup>827</sup> May 20; <sup>1</sup> Aug. 16 regards it as superior to all other remedies, because of the certainty of its action and the absence of all toxic effect, since it is absorbed in but very minute amount by the gastrointestinal mucous membrane. The dose for adults is 15 grains (0.97 gramme), taken when the stomach is empty, and followed immediately by 2 tablespoonfuls of castor-oil. For children, the author employs the following formula:—

R Naphthalin, . . . . .	4½-7 grains (0.29 to 0.45 gramme).
Castor-oil, . . . . .	½ ounce (18.75 grammes).
Essence of bergamot, . . . . .	2 drops.

For two days preceding the administration of the drug the patient should eat freely of salted, acid, and highly spiced foods. Merovitch states that, in all his cases, 1 dose of naphthalin was sufficient to expel the tape-worm, the head included, even in cases in which other drugs had failed. He also found it most effective in the treatment of ascarides.

Quinot <sup>212</sup><sub>July 10</sub> furnishes an interesting communication concerning the tænicidal properties of mercury as given by him (Dupuytren's pills) to 2 syphilitic patients.

Batten, of Pittsburgh, <sup>61</sup><sub>July 4</sub>, states that his treatment is the oil of turpentine, tablespoonful doses after a light meal.

The ethereal extract of male fern remains the standard remedy, notwithstanding the numerous substitutes. Poulsson <sup>273</sup><sub>July</sub> contributes an interesting and valuable article on its toxic and tænifugal principle.

Poulsson shows that the pure crystalline filicic acid, obtained by treating ethereal extract of male fern successively with ammonia and hydrochloric acid, has no toxic properties, and that the toxic and tænifugal properties are held by the amorphous form, usually regarded as the impure acid.

He credits the tænifugal action of the extract of male fern to the amorphous filicic acid. The addition of oils facilitates its absorption. According to the researches of Rulle, the dose of filicic acid as a tænicide should be from 0.9 gramme to 1.2 grammes ( $13\frac{3}{4}$  to 65 grains).

In the discussion following a review of the above work, given by Poulsson at the International Medical Congress, in Berlin, <sup>2000</sup><sub>Ab. 4, p. 27</sub> Kobert (Dorpat) stated that the *Extractum filicis Wolmanense*, which is generally used in the Baltic provinces, is ten times more poisonous than the German, and twenty times more so than the French extract. The amount of filicic acid in the three preparations does not, however, maintain the proportions of 1 : 10 : 20, and thus seems to contradict Poulsson's analysis, according to which the filicic acid is alone active. The ethereal oil of fern has, according to Kobert, vermicial properties. Kobert, in speaking of the relative amount of filicic acid in the various extracts, appears to have made no account of the crystalline or amorphous condition of the acid, the point upon which the value of Poulsson's observations seem to hang. Plugge (Groningen) called attention to Hugo Schiff's experiments, according to which the so-called filicic acid is neither an acid nor an acid anhydride, but rather a ketone.

To this Poulsson replied that Schiff acknowledged his formula for filicic acid as purely hypothetical, while Luck, the discoverer of filicic acid, held to the last the view that it is an anhydride. Liebreich (Berlin) called attention to the change in the action of a

drug accompanying the molecular change produced by crystallization, and cites chloral hydrate as an instance.

Léméré de Conty<sup>230</sup><sub>Nov., '90</sub> recommends the following treatment: (1) milk diet from twenty-four to thirty-six hours; (2) rest; (3) clysters in the evening; (4) in the morning the following:  $\mathcal{R}$  Ext. ether. filix-mas, 4 grammes (56 grains); calomel, 0.40 gramme ( $6\frac{1}{5}$  grains) for a child of 6, 6 grammes ( $1\frac{1}{2}$  drachms) for an adult. The advantages of the treatment are: (1) ease of taking small doses; (2) rapid effect, usually about half an hour; (3) absence of discomfort at the time or afterward; (4) dispensing with the use of castor-oil.

Szczesny-Bronowski, of Tcherdyn,<sup>520 109</sup><sub>Nov. 17; July</sub> claims that the following mixture invariably proves efficacious, even in the most obstinate cases, when the usual administration of ethereal extract of male fern, pomegranate-bark, or koussou-flowers has failed:—

$\mathcal{R}$ Extract felicis maris ætherei,	. . .	3iij (10.00 grammes).
Chloroformii, . . . . .	. . .	℥ij ( 2.20 grammes).
Emulsionis olei ricini, ex., . . .	. . .	3vj-3iij (20.00 to 10.00 grammes).
Syrupi menthæ, . . . . .	. . .	3j (31.00 grammes).

M. Sig.: Divide in two equal portions and take both, with half-hour intervals, early in the morning, on an empty stomach. The mixture should be well cooled before using.

F. Semeleder, of the City of Mexico,<sup>673</sup><sub>Dec.</sub> corresponding editor, speaks of the frequent use in Mexico of pumpkin-seeds as a tæni-fuge. He attempted to do away with the bulky dose by pressing the seeds and administering the oil, which, naturally, had no effect, since the tæni-fugal properties of pumpkin-seed have been demonstrated to be a greenish resin contained in the perisperm (ANNUAL, 1890, F-16).

#### TREMATODA.—FLUKE-WORMS.

Villeneuve, of Marseilles,<sup>46</sup><sub>June 30</sub> reports a case of bilharziasis in a Corsican who had seen military service in Tunis. The patient passed bloody urine, in which were found numerous embryos of *Bilharzia hæmatobia*. Inasmuch as this parasite has not been reported as occurring in Tunis, and the patient never having visited Egypt, Villeneuve calls the attention of physicians practicing in French sea-ports to the advisability of careful examination of patients coming from African ports, for the purpose of determining with greater accuracy the geographical distribution of this parasite. Brault, of Lyons,<sup>211</sup><sub>No. 51</sub> reports what seems to be the case here referred

to by Villeneuve, inasmuch as the patient left Marseilles without awaiting treatment. Brault confirms the diagnosis of Villeneuve, referring also to the fact that Tunis is a new district for the parasite. His treatment consisted of washing out the bladder with a solution of boracic acid and the alternate administration of salol and turpentine.

F. Katsurada<sup>200</sup><sub>Aug.31</sub> reports on the prevalence of distomiasis in Okayama Prefecture of Japan, identifying the parasite as *Distomum endemicum*, Baelz.

#### NEMATODES—THREAD-WORMS.

*Oxyuris vermicularis*.—The difficulty met with by all practitioners in freeing children from pin-worms calls out an annual array of prescriptions. Sidney Martin<sup>298</sup><sub>Jan.10</sub> recommends small doses of rhubarb. He advises the following formula:—

R Tincture of rhubarb, . . . . 20 drops.  
 Carbonate of magnesium, . . . 3 grains ( 0.19 gramme).  
 Tincture of ginger, . . . . 1 drop.  
 Water, . . . . . 3 drachms (11.25 grammes).

Believing that the parasites infest portions of the intestines un-reached by the common rectal injections, D. R. Sartor, of Alto, La., has treated 20 cases, without failure, with the following:—

R Acetate of potassium, . . . . 1½ ounces ( 45 grammes).  
 Tinct. of muriate of iron, . . . 1 ounce ( 31 grammes).  
 Water, . . . . . q. s. ad 8 ounces (240 grammes).

M. Sig.: One tablespoonful in wineglass of water three times a day, taken one hour before meals.

It should be continued, in tablespoonful doses, until free purgation is produced and all the worms have been discharged, which will be about the end of the third or fourth day, when the dose should be reduced to a teaspoonful three times a day, and continued for three or more succeeding days. R. L. Hinton, of Prescott, Ark.,<sup>186</sup><sub>Oct.</sub> suggests the following:—

R Aloes,  
 Carbonate of iron, . . . . . aa 1 grain (0.065 gramme).

Sig.: Make pill. This makes one dose, to be taken at bed-time every night, unless too much action on bowels, in which case miss a dose as occasion may require.

E. A. Farquhar, Jr., of Zanesville, Wis.,<sup>186</sup><sub>Oct.</sub> has used, during twenty years, with the best result, the following:—

R Cape aloes (powdered), . . . 6 drachms (23.33 grammes).  
 Soda bicarb., . . . . . 2½ drachms ( 9.72 grammes).  
 Tr. anise, . . . . . 2 drachms ( 7.78 grammes).

Dissolve the aloes in 4 ounces (120 grammes) of hot water; when cold, add the soda, shake thoroughly until dissolved, then add the tincture of anise; add 2 drachms (7.78 grammes) tincture of asafetida and syrup q. s. to make 18 ounces (540 grammes).

Sig.: Give from 2 teaspoonfuls to 1 tablespoonful, at night, until the bowels are freely moved; repeat again in four or five days.

John J. Legget, of Ladiesburg, Md.,<sup>186</sup><sub>Nov.</sub> has for three years used salol with success. To an adult he gives 5 to 8 grains (0.32 to 0.52 gramme), dry, on the tongue, at bed-time, for a week.

Wm. Nephew King, of New York City,<sup>186</sup><sub>Oct.</sub> states that pin-worms can be most effectually destroyed by the use of a saturated aqueous solution of the best Socotrine aloes, 1 ounce (31 grammes) of this solution being injected into the rectum at bed-time, and retained as long as convenient. This should be done for several nights consecutively, then discontinued; and, if there is any return of the parasite, it should be used again in the same way.

W. Thornton Parker, of Salem, Mass.,<sup>9</sup><sub>July 18</sub> relies wholly upon the following course of treatment: Copious rectal injections of chloride of sodium in solution, or of boroglyceride (1 to 20), followed by small suppositories of boroglyceride. A dose of fluid extract of spigelia and senna in the morning, with a moderate dose of castor-oil a few hours later, with reasonable attention to errors in diet, and particularly as to the water-supply, is all the additional treatment required.

H. W. Barnard, of Charleston, Ill.,<sup>186</sup><sub>Oct.</sub> suggests injections of coal-oil two or three times a day; and the following sums up the practice of French physicians<sup>9</sup><sub>Mar. 26</sub>: Success in the treatment of cases of seat-worms depends upon the prolonged and constant use of a vermifuge or some active vermicide. The worms are generally attacked by means of injections, suppositories, or ointments. Of the injections, a favorite prescription is a solution of common salt in the proportion of 1 to 5. Sometimes sugar and water may be used, and an infusion of absinthum is employed by some French practitioners. Still others employ simply cold water. It is said that West and Barthez recommended astringent injections composed of the perchloride of iron and lime-water, as follows:—

R Lime-water, . . . . . 6 ounces (180 grammes).  
 Perchloride of iron, . . . . . 10 drops.—M.

And also

R Lime-water, . . . . . 4 ounces (120 grammes).  
Decoction of marsh-mallow, . . . 1 ounce ( 30 grammes).—M.

For the same purpose, Trousseau prescribed suppositories of tannin, made up as follows:—

R Tannic acid, . . . . . 15 grains (0.97 gramme ).  
Cocoa-butter, . . . . . 1 drachm (3.89 grammes).—M.

Other physicians have employed injections of asafœtida, and many have found the following treatment useful:—

R Alcoholic extract of senna-leaves, 30 grains ( 1.94 grammes).  
Boiling water, . . . . . 4 ounces (120.00 grammes).—M.

Make an infusion, and sweeten with syrup of wild cherry, 4 drachms (18.75 grammes). This may be given to an infant of 4 or 5 years as a laxative, and if it does not act may be followed by from  $\frac{1}{2}$  to 1 drachm (1.94 to 3.89 grammes) of the sulphate of magnesium.

After this an injection may be given, composed of 1 ounce (31 grammes) of powdered quassia-chips to 1 pint ( $\frac{1}{2}$  litre) of water, or of carbolic acid in the proportion of from  $\frac{1}{2}$  to 1 drop to 4 ounces (120 grammes) of water.

An emulsion of calomel may be employed, composed of calomel, 3 grains (0.19 gramme), and mucilage of flaxseed, 4 ounces (120 grammes).

Guersant is said to employ sulphuretted potash,  $2\frac{1}{2}$  drachms (9.72 grammes); water, 4 ounces (120 grammes); while Rossbach finds naphthalin of great service, and administers it as an injection as follows:—

R Naphthalin, . . . . . 15 grains ( 0.65 gramme ).  
Olive-oil, . . . . .  $1\frac{1}{2}$  ounces (56.00 grammes).—M.

This quantity may be doubled or tripled in adults. Sometimes he prefers to use naphthalin, from 2 to 10 grains (0.13 to 0.65 gramme), and decoction of marsh-mallow, 6 ounces (180 grammes). If the worms inhabit the lowest portion of the intestines it may be well to follow the treatment of Cruveilhier, viz., to employ mercurial ointment, or to rub into the anus an ointment composed of calomel, 8 grains (0.52 gramme), and cocoa-butter, 1 drachm (3.89 grammes).

Trousseau is said to employ the following suppositories:—

R Calomel, . . . . . 1 drachm ( 3.89 grammes).  
 Vaseline, . . . . . 3 drachms (14.06 grammes).—M.

When the worms inhabit the higher portions of the rectum they will probably resist all therapeutic measures, unless they are attacked through the stomach. Under these circumstances it may be well to employ calomel and santonin, of each  $\frac{1}{2}$  grain (0.032 gramme), which is to be administered early in the morning, in order that the calomel may act by evening. This dose is the proper one for a child of 2 to 3 years.

*Ascaris*.—According to C. S. Reeves, of Lone Grove, Tex., a practitioner of some thirty-five years' experience, no case of lumbricoid worms has ever been recorded west of Dallas. On the other hand, oxyuris is very common. The chances are that it has not been customary for the physicians of Western Texas to record their cases in medical journals, and that, in the majority of cases of worms, no physician would be consulted, but recourse be had to the various worm-lozenges and worm-teas for sale by all druggists.

Ernest B. Sangree<sup>760</sup><sub>Mar. 23</sub> records a curious case occurring in the practice of B. B. Adams, of Washington, D. C. A 3-year-old boy swallowed a small tin whistle, which, after causing serious symptoms by lodging first in the œsophagus and then in the stomach, was finally discharged *per anum*, with a five-inch lumbricoid worm fastened in the central hole of the whistle, which was one of those made of two circular pieces of tin, about an inch in diameter, attached by the edges.

William W. Shrubshall, of the English Methodists' Mission, Tientsin, China,<sup>2</sup><sub>Mar. 23</sub> writes of a curious case, in which a boy 9 years old exhibited, besides the ordinary symptoms of lumbricoids, a painful swelling about an inch to the left of the umbilicus. Having been given santonin, he returned in a few days and reported that he had passed many worms, both *per anum* and by vomiting, and that the sore spot mentioned above had finally burst at the navel, and a worm, about eight inches in length, had "come out" there. The umbilicus exhibited a minute opening, through which, on pressure, a little clear fluid exuded, but there was no sign of acute inflammation.

Surgeon E. Harold Brown, of Barisal, India,<sup>239</sup><sub>Mar.</sub> reports a case of suicide caused by paroxysms of pain, which proved to have been caused by a worm, eight inches in length, occupying the hepatic duct of the right lobe. "The duct which it had occupied was very widely dilated, as were also the smaller branches which communicated with it. This duct received tributaries from about a third of the entire right lobe, and all the ducts in this part of the organ were widely dilated."

G. Borger<sup>2111 844</sup><sub>H.1, Aug.22</sub> presented a case of abscess of the liver, due to ascarides, in a female child  $4\frac{1}{2}$  years old. The biliary ducts were greatly dilated and thickened, and in many were found young specimens of ascaris. In the ductus choledochus were 12 worms, all females, with their heads directed toward the liver. Borger asks if these ripe worms may not have a habit analogous to that of many fish which swim up-stream at the spawning season, and of placing their eggs at the highest possible point.

Heydenreich, of Nancy,<sup>3</sup><sub>Aug.19</sub> tells of a case of intestinal obstruction in which Nélaton's operation was performed in the left groin, with successful results, and the artificial anus was completely and permanently closed by a novel autoplasic operation. It is held that the obstruction in this case was directly due to the blocking of the intestine by an accumulation of round-worms. The case, however, up to the time of the operation, was diagnosed and treated as one of intussusception, and neither in this supposed instance of occlusion by round-worms nor in 3 other cases, which were all that the author could find in surgical literature, was the relation between the obstruction and the presence of round-worms in the intestinal canal sufficiently close to permit one to reject positively the strong doubts that were expressed by Davaine on this point. The subject of the case was a child, aged 11 years, who came under the notice of the author on the ninth day of a severe attack of obstruction. The case having been diagnosed as one of intussusception, the idea of performing laparotomy was not entertained, as it was thought that the adhesions between the layers of intestine would be too firm to permit of the invaginated portion being drawn out. The small intestine was opened in the left groin on December 27th, and, two days later, a bulky mass, made up of 7 round-worms, presented itself at the artificial anus, and was extracted. The young patient quickly recovered

from the attack of obstruction, and, as has already been stated, the artificial anus was subsequently closed. In this, and also in 1 of the 3 collected cases, blood was passed from the anus during the period of obstruction.

Bernard <sup>220</sup><sub>Mar. 22</sub> exhibited, from the autopsy of a child, a loop of intestine containing a mass of 10 or 15 twisted lumbricoids, forming an obstruction sufficient to resist the quite strong water-pressure. Other worms were free in the intestine. The death of the child was, however, undoubtedly due, as shown by Eustache, to central lesions, and the ascarides could only be considered a coincidence.

Epstein, of Prague, <sup>34</sup><sub>Sept. 29</sub> finds that fresh air, high temperature, sunlight, and fæcal matters furnish the needful conditions for the rapid development of eggs to embryos. Under such conditions Epstein reared embryos in five weeks. Eggs remain capable of development for a year or more. Living embryos were administered to 3 children, whose fæces had been long free from ascaris eggs, and within two months eggs appeared. This is the first reliable information regarding the result of infecting man with ascaris eggs. Epstein found 52 per cent. of village children and 42 per cent. of city children affected with ascaris.

Cerchez <sup>259</sup><sub>July 15</sub> presented to the Medical Society of Bucharest an account of a case of asphyxia, at first supposed to be homicide, but which the autopsy proved to have been caused by the presence of an ascaris, twenty-five centimetres long, in the larynx.

Oliver P. Rex <sup>51</sup><sub>Jan.</sub> gives the following as his favorite prescription for lumbricoid worms:—

R Santonin,	.	.	.	.	.	8 grains ( 0.52 gramme).
Ext. spigeliæ et sennæ, fluid,	.	.	.	.	.	1 ounce (30.00 grammes).
M. Sig.: One teaspoonful three times a day.						

This should be followed by a dose of castor-oil. The further treatment of lumbricoid worms is to correct the diseased state of the mucous membrane.

*Anchylostomum duodenale*.—Felice Lussana <sup>589</sup><sub>Feb. 12</sub> states that the direct abstraction of blood by the parasite is not an adequate cause of the grave anæmic condition, which he attributes to the activity of the parasite in determining alterations in the chemism of digestion, whereby deleterious organic substances are produced, which, being absorbed, bring about grave and progressive alterations in

sanguification, the anæmia of anchylostomiasis being an excellent example of the maladies of auto-intoxication. The writer's conclusions are based upon a carefully conducted series of experiments, consisting in the hypodermatic injection in rabbits of extract of urine from patients suffering from anchylostomiasis and from those whose recovery had followed anthelmintic treatment. The rapid recovery of such patients, and of the animals in which the anæmic conditions had been produced by the administration of the urine extract, indicates that the poison is not cumulative, but is generated and absorbed, and active only so long as the parasites are present.

Morienvall de Chaulnes<sup>230</sup> gives the details of a case of grave anæmia, which he was unable to relieve with ferruginous treatment, but which yielded at once after the administration of male fern. Although microscopical examination failed to furnish conclusive evidence of the presence of anchylostoma, Morienvall was convinced that the anæmia was the result of the presence of these parasites. Schlegtendal<sup>311</sup> gives a *résumé* of the recorded symptoms and proposed prophylaxis of anchylostomiasis. He attributes the anæmia to the abstraction of blood by the parasites, and is evidently ignorant of the experiments of Lussana referred to above.

*Strongylus gigas*.—Z. T. Martin, of Lathrop, Mo., reports a case of hæmaturia accompanied by intense pain, and which was immediately and completely relieved by the voluntary passage through the flexible catheter of two specimens of *Strongylus gigas* measuring seven and fifteen inches respectively.

*Trichina spiralis*.—A. Seibert, of New York,<sup>150</sup> shows that from 5 to 16 per cent. of American hogs are infected with trichina, while German hogs show only 1 case in every 2000.<sup>2112</sup> Notwithstanding the remarkable discrepancy in the opportunities for infection, trichinosis is much more prevalent in Germany than in America,—a fact which Seibert partly attributes to the common habit the Germans have of eating raw meat and partly to the careful attention given to the subject by German physicians and meat inspectors. He refers to statistics from Berlin, showing that, in 1877, there was no obligatory meat inspection, and only 6 cases of trichinosis in man came to light; whereas, in 1878, after obligatory meat inspection had been established and the attention of physicians more generally directed to the subject, 102 cases are recorded, with 8 deaths. It is, therefore, probable that trichinosis

in man would prove to be much more frequent in America than is shown by our statistics if the physicians and officials were legally obliged to give greater attention to its detection. The symptoms—swelling, pain, and weakness of the muscles, with œdema of the skin—having been treated in previous articles (ANNUAL, 1888, vol. i, p. 397; 1889, vol. i, F-19; 1890, vol. i, F-21), need not be repeated here. Seibert concludes that trichina embryos leave the rectum in its lower portion where it is destitute of peritoneal investment, passing directly into the contiguous muscles, wandering thence throughout the muscles of the body. This conclusion is criticised by C. Heitzmann,<sup>2113</sup><sup>150</sup><sub>Oct.</sub> on the ground that the embryos are not provided with adequate structure or strength to bore through the intestinal wall and to wander through the tissues to distances so enormous as compared with their own length and in such short periods of time. Heitzmann accounts for the presence of trichinæ in the muscles by what he terms the embolus theory. Heitzmann discovered in 1867, while in Stricher's laboratory in Vienna, fine openings between the epithelial cells of the intestinal villi leading directly into the lacteals.<sup>2113</sup><sub>p.599</sub> He asserts that through these openings the trichinæ gain entrance to the lacteals, and, passing on through the lymphatics and the thoracic duct to the heart, are distributed through the circulation. The fact of their final arrest in the muscles and their absence from the viscera and the heart-muscles is accounted for by the peculiar right-angled relation of capillaries to the arteries in all striated muscles except those of the heart, the sharp turn tending to stop the embolic embryos in their course. The capillaries of the heart, he maintains, branch at such sharp angles as to offer no obstacle to the passage of the trichinæ.

Heitzmann was evidently, at the date of his address, ignorant of the latest investigations into the anatomy of the heart, and of the existence of the so-called "Meigs's capillaries," as described in the interesting paper of A. V. Meigs, of Philadelphia.<sup>2011</sup><sub>Apr.1</sub> The following sentences, quoted from Meigs's article, show how purely theoretical are the conclusions of Heitzmann<sup>2113</sup><sub>p.4</sub>: "The small efferent capillary even forms a right angle with the larger one, thus emptying its blood into a stream flowing directly at a right angle to its course up to its termination. . . . The capillaries run, of course, in all directions amongst the muscular fibres,—parallel with and between them, at acute angles across them, and

again often at right angles." There are many other objections to be raised to the embolus theory of trichinæ dispersion as presented by Heitzmann.

An official laboratory for the examination of pork, bacon, etc., intended for export, has been established at Chicago, by Rusk, Secretary of Agriculture, the staff consisting of some thirty microscopists, working under the direction of John Michels, of New York, and F. H. Bernard, of Pittsburgh.<sup>2</sup> Wm. Whelpley<sup>275</sup><sub>Oct.</sub> contributes an interesting *résumé* of the more general knowledge of trichina, and Lichtheim and Lewin<sup>4</sup><sub>No.2</sub> some remarks on the histological lesions of trichinosis. W. Heisen, of Denver,<sup>155</sup><sub>Nov.</sub> reports a case of trichinosis, which was discussed by Lobin-gier, Pershing, Wetzell, Rogers, and Worthington.<sup>155</sup><sub>Nov.</sub> Four cases, 1 fatal, are reported by Alembly Jump (Downieville, Cal.).<sup>77</sup><sub>Apr.</sub>

The cases of trichinosis occurring on the German bark "Nixie," at Iquique, and reported to have followed the eating of American pork, prove, from the report of the captain, to be directly attributable to fresh pork purchased and eaten by the crew in Iquique, American salt pork having absolutely nothing to do with the case.

Wm. Hutchinson Merrill, of Pepperell, Mass.,<sup>1</sup><sub>Sept.19</sub>,<sup>61</sup><sub>Nov.7</sub> claims that arsenic (Fowler's solution) exercises "strong curative effects" in trichinosis. Heisen<sup>155</sup><sub>Nov.</sub> claims the same results for glycerin in small doses.

*Trichocephalus dispar.*—Moosbrügger, of Leutkirch, supplements his valuable contribution of last year (ANNUAL, 1891, vol. i, F-16) by another<sup>133</sup><sub>Sept.30</sub> on trichocephaliasis. The disease manifests itself in children by marked anæmia and profuse, blood-stained diarrhœa. Microscopical examination of the fæces shows the presence of numerous eggs of *Trichocephalus dispar*. Each gramme (15½ grains) of fæces was estimated by Leichtenstern to contain from 2350 to 3655 eggs, giving for twenty-four hours 1,500,000 eggs,—indicating the presence of from about 900 to 1500 parasites. Naphthalin and other parasitocides proved ineffectual. Moosbrügger considers the whip-worm to be by all odds the most frequent and wide-spread parasite in the neighborhood of Leutkirch, and is confident that microscopical examination of the fæces of anæmic children would prove it to be much more common than is supposed.

*Filaria sanguinis hominis.*—Rudolph Matas<sup>12</sup><sub>Jan.</sub> adds to the evidence furnished by Mastin (ANNUAL, 1889, vol. i, F-14) and

de Saussure (ANNUAL, 1891, vol. i, F-13), that filariosis is actively endemic in the Southern United States, by presenting the details of a case of parasitic chylocele of the tunica vaginalis testes. Matas calls the attention of physicians in the Southern States to the necessity of a more careful inquiry into all cases of lymphatic varices, chylocele, chyluria, elephantiasis, etc., the blood and lymph to be subjected to microscopical scrutiny for the discovery of the embryo parasites.

Patrick Manson, <sup>6</sup><sub>Jan. 3</sub> as the result of a careful examination of the blood-parasites accompanying cases of filariosis, or "sleeping sickness of the Congo," in Congo negro patients, comes to the conclusion "that man is liable to be the host of at least two, if not three species of filarial hæmatozoa." Further consideration proves "that one type of embryo is not a transition form of the other, nor in any way connected with it, but that the two forms of hæmatozoa are specifically distinct." To facilitate comparison, Manson arranges the distinctive features of the two new species of hæmatozoa as observed by him, and of Lewis's filaria, in the following table:—

<i>Filaria sanguinis hominis</i> , Lewis.	<i>Filaria sanguinis hominis</i> major.	<i>Filaria sanguinis hominis</i> minor.
<ol style="list-style-type: none"> <li>1. Measures <math>\frac{1}{16}</math> by <math>\frac{3}{16}</math> inch or thereabouts (Lewis).</li> <li>2. Is provided with a sheath.</li> <li>3. Caudal end tapers gradually for about one-fifth of the entire length of the animal, and terminates in a sharp or nearly sharp point.</li> <li>4. Cephalic end is rounded off, and has obscure oral movements of a pouting character.</li> <li>5. No tongue-like organ visible.</li> <li>6. Appears in the blood at night, disappearing during the day.</li> <li>7. Has a wriggling, but no locomotive movement.</li> <li>8. Many specimens have a granular-looking aggregation about the middle of the body.</li> </ol>	<ol style="list-style-type: none"> <li>1. Measures <math>\frac{1}{16}</math> by <math>\frac{3}{16}</math> inch or thereabouts.</li> <li>2. Is provided with a more delicate sheath.</li> <li>3. Caudal end tapers gradually for about one-fifth of the entire length of the animal and terminates in a sharp or nearly sharp point.</li> <li>4. Cephalic end is rounded off, and has distinct oral movements of a pouting character.</li> <li>5. No tongue-like organ visible.</li> <li>6. Appears in the blood during the day, disappearing during the night.</li> <li>7. Has a wriggling, but no locomotive movement.</li> <li>8. No granular aggregation about the middle of the body.</li> </ol>	<ol style="list-style-type: none"> <li>1. Measures <math>\frac{1}{16}</math> by <math>\frac{3}{16}</math> inch or thereabouts.</li> <li>2. Has no sheath.</li> <li>3. Caudal end tapers more gradually for two-thirds of the entire length of the animal, and is abruptly truncated where it has tapered to about one-third of the diameter of the thickest part of the body.</li> <li>4. Cephalic end is either conical or truncated, passing from one form to the other rapidly, by a peculiar jerking, extruding, and retracting movement.</li> <li>5. From time to time a minute, tongue-like organ is rapidly protruded and withdrawn at the extremity of the cephalic end.</li> <li>6. Observes no such periodicity.</li> <li>7. Has a locomotive as well as a wriggling movement.</li> <li>8. No such appearance is visible. In fresh specimens the body is, throughout, perfectly homogeneous and transparent.</li> </ol>

Manson <sup>22</sup><sub>Aug. 26</sub> proposes to change the nomenclature of the above parasites, and to call the worms, respectively, *Filaria sanguinis*

*hominis diurna* (= *f. s. h. major*), *Filaria sanguinis hominis nocturna* (= *Lewis's filaria*), and *Filaria sanguinis hominis perstans* (= *f. s. h. minor*).

*Rhabdonema intestinalis*.—Sonsino<sup>900</sup><sub>July 20</sub> describes 3 cases of rhabdonemiasis, accompanied by grave gastro-enteric phenomena and profound anæmia. The author attributes the symptoms to the direct abstraction of blood by the parasite, as in the case of anchylostomiasis (Perroncito). The patients afflicted with rhabdonema were, like those suffering from anchylostomiasis, accustomed to digging and working in the dirt, and to drinking water from pools and ditches. The author only succeeded in obtaining the strongyloid or filariform embryo, having a length of about 600 micromillimetres, but failed to secure any of that stage called *Anguil lula stercoralis*, Bavay, which recent observers incline to regard as the free form of *Rhabdonema intestinalis*.

#### FACULTATIVE PARASITES—LARVÆ OF DIPTERA, ETC.

H. M. Whelpley<sup>82</sup><sub>Dec. 20, '90</sub> again refers to what he calls the chigger, or sea-tick (see ANNUAL for 1890, vol. i, F-22). He gives it the name of *Leptus irritans*, on the authority of an article by Riley, written in 1873. It is now known that the six-footed mites which, under Latreille's system of classification were held to be species of the different genera of his ninth family, *Microphthiridæ* (*μῖκρος*, small; *φθειρ*, a louse), are, in reality, the larvæ of harvest-mites (*Trombidiidæ*, e.g., *Leptus*, *Ocypetus*, and *Atoma*), water-mites (*Hydrachnidæ*, e.g., *Achlysia*), and the beetle-mites or spider-mites (*Gamasinæ*, e.g., *Caris*). Thus, the *Leptus irritans* is undoubtedly the larva of *Tetranychus telarius* (possibly of *Trombidium holosericeum*), which, under the names of *kupferbrand* and *grasmilbe*, has long been a familiar pest in Germany, both to plants and, during the harvest season, to human beings.

In regard to the case of A. J. White, of Cortland, N.Y.,<sup>186</sup><sub>Aug.</sub> an 18-month-old child, after suffering from the most startling symptoms, was relieved by vomiting a large number of dipterous larvæ. We could call attention to the criticisms of Sven Lampa, referred to in a previous article (ANNUAL, 1889, vol. i, F-25), that physicians, as a rule, fail to rear the larvæ to the adult flies, by which means alone is it possible to make a positive identification of species.

W. L. Goddard, of Saulsbury, Tenn.,<sup>186</sup><sub>Oct.</sub> contributes an interesting case of fly-larvæ infesting an infant, as follows:—

On August 1st last, N. R. sent me a “worm” for identification, which had passed that day in the alvine discharge of his baby aged 3 months. On August 4th he brought me another one of the same species. I pronounced them the larvæ of some species of fly, and, to prove to Mr. R.’s doubting mind, I put both “worms” into a small vial for further development. One of the “worms” died; the other, the next day after its arrival, changed into the pupa state, and, five days afterward, hatched out a fully-developed house-fly,—*Musca domestica*. The baby had passed 8 of the larvæ from its bowels up to that time. It had been fed partly artificially, which accounts for the egg or larva being conveyed into its intestinal canal. Mr. R. also said: “After the navel-string came away, we found that the maggots had got into the baby’s navel. They were very large (measuring from the end of my finger about three-fourths inch) and two layers deep lengthways, and as tight as they could be packed.”

In this connection, it may be worth while to recall the assertion by Summa (ANNUAL, 1890, vol. i, F-23 to 25), that “myiosis intestinalis is always caused by a species of the genus *Anthomyidæ*,” and the subsequent evidence produced by Senator, of Berlin, to show that the larvæ of the house-fly are not uncommonly the cause of myiosis (ANNUAL, 1891, vol. i, F-22).

Under the heading “Action of Different Drugs on Larvæ,” A. R. Aldridge, of Jullundur, Punjaub,<sup>6</sup><sub>Sept. 27, Dec. 27, '90</sub> recommends the use of a few drops of chloroform poured into the wound; or, in myiosis narium, of “chloroform-water, twice the pharmacopœial strength, 2 drachms to 25 ounces (3.38 to 750 grammes).” Physicians will save time and annoyance to patients if they will follow the suggestions of the late Dr. Leidy (ANNUAL, 1888, vol. i, p. 400), viz.: “We may here say that if it is once understood that all insects, including lice and mites, are quickly destroyed by the application of any fixed or volatile oil, physicians will see that there is no necessity of employing remedies of a noxious character to the patient. The fat of mercurial ointment is probably more quickly active than the mercurial oxide.”

## DIABETES MELLITUS.

By ALLEN J. SMITH, M.D.,

GALVESTON.

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*Nature and Etiology.*—The question of the identity of this affection and the transient glycosurias cannot but attract a certain amount of attention, especially in the present state of our knowledge as to the exact nature of diabetes mellitus. Naturally, the opinions of the profession separate with the division between clinical and theoretical medicine; the clinician recognizing a wide difference between the slight, transitory presence of sugar in the urine of a patient, as a rule but mildly ill, and the long-continued and fatally terminating disease whose surest sign is this same glycosuria. The researches of the laboratory student, on the other hand, have resulted in demonstrating positive relations between even the severe forms of the glycosuria—severe enough to merit the denomination of diabetes mellitus—and such numerous and diverse lesions of the organism, that from this point of view one is urged to regard every glycosuria as but syndromic, and the mildest and most passing as differing but in degree from the severest and most persistent.

From a careful consideration of the conclusions arrived at by investigators upon this point during the past year, one is urged most strongly to the belief that the mere excretion of sugar in the urine is but a symptom, identical in each case in its nature, but varying in its cause; that sugary urine cannot be regarded as synonymous with those grave affections which we group under the clinical term diabetes; that, in fact, glycosuria is but an inconstant symptom of such affections, as it is of that other class in which it occasionally appears as a transitory symptom. In other words, while there exist differences between diabetes mellitus and transient glycosuria, these do not exist in the symptom glycosuria, but in more hidden and deeper alterations, which may or may not arouse the excretion of sugar in the urine as a symptom. Perhaps

it could be best stated in the following manner: that the excretion of sugar is a symptom characterizing more or less inconstantly a number of transient affections of slight gravity and present more constantly, but nevertheless not uniformly, in several graver and usually fatal affections of the nutrition of the body, these latter constituting the several varieties of diabetes mellitus. This is virtually the position assumed by Lancereaux<sup>55</sup> and by Bou-  
tard,<sup>100</sup> who separate the transient glycosurias from the graver diabetes by a difference of degree; the latter is, further, no unique affection, but dependent upon varying pathological factors. They recognize at least three well-marked clinical varieties of diabetes mellitus: (1) that form associated with obesity,—a constitutional affection; (2) that form associated with wasting due to lesions of the pancreas; and (3) that form depending upon some fault of the nervous system. Rendu,<sup>3</sup> in a lecture inspired by a case of  
pancreatic diabetes, classifies the various affections in which the symptom glycosuria is present into (a) temporary glycosurias, usually caused by overexertion, often cerebral,—seen also in acute infectious diseases and in poisoning by coal-gas,—due to medullary congestion; (b) diabetes of nervous origin, corresponding to the experimental glycosurias caused by puncture of the floor of the fourth ventricle; (c) constitutional diabetes, of which he recognizes two varieties,—the gouty, or diabetes with obesity, and the pancreatic or wasting diabetes. While theoretically these latter are clearly enough differentiated, clinically there exist relations between them, in that the etiological conditions may be the same; in the same family two members may be affected by the two different forms, and a gouty person may be affected by wasting diabetes and *vice versa*. The author, however, does not subscribe to the invariable production of diabetes by pancreatic lesion, quoting several others to maintain his position; but he does believe that such lesions determine glycosuria and diabetes more uniformly than do lesions of the fourth ventricle. Upon clinical grounds alone, Collins<sup>90</sup> endeavors to draw a line of separation between glycosuria and diabetes, having in the capacity of life-assurance examiner been brought in contact with a number of cases of glycosuria which did not terminate in diabetes within a tolerable limit of time.

Moritz<sup>34</sup> contributes a paper discussing the subject of

the relation between diabetes and the transient glycosurias. This difference, in the opinion of the writer, depends upon the duration of the phenomenon of sugar excretion and upon the presence of various toxic substances in true diabetes, as acetone, aceto-acetic acid,  $\beta$ -oxybutyric acid, and others. This difference is really but a superficial one; and the author, in his discussion of the tendency in the glycosuric to become diabetic, fails in his point, in a measure from the failure to appreciate the symptomatic nature of both conditions. Of the glycosurias he constructs two classes,—those following various pathological conditions and the physiological glycosurias. In the first group he places the experimentally developed cases,—those due to injury to the floor of the fourth ventricle, medulla, or lower cervical or upper thoracic sympathetic ganglia, to destruction of the lumbar cord, section of the sciatic nerves, etc.; those due to the injection of arterial blood into the portal vein; to stimulation of the liver by the galvanic current; to dyspnoea from obstructed respiration; those due to extirpation of the pancreas; those due to various toxic substances and the recently-studied form from phloridzin. Clinically, this group is seen after various injuries to the nervous system, in apoplexy, epilepsy, the different forms of mental disease, sciatica, in hepatic cirrhosis, cardiac failure, gout, phthisis, infectious diseases, etc. Under the physiological type the glycosurias of the puerperium and of lactation are mentioned, together with the glycosurias of alimentary origin. In a second paper <sup>319</sup><sub>No. 28</sub> Moritz discusses these last-named glycosurias. By means of the phenyl-hydrazin test he has come to the conclusion that there are traces of sugar in normal urine. In the ordinary mixed diet this amount is always very small and unimportant; however, under the influence of excessive amounts of carbohydrate food, especially in the form of sugar, this is much increased. After the consumption of great quantities of grape-sugar dextrose may be found in the urine; after lævulose consumption, lævulose; after cane-sugar consumption, cane-sugar; after lactose has been ingested in large quantities, grape-sugar may be found. In the experiments of this investigator glycosuria was not induced by the ingestion of excessive amounts of starch in the shape of macaroni. Moreover, the author states that, in the production of such an alimentary glycosuria, the question of person enters in great importance. This latter feature

is strongly suggestive of the identity of these glycosurias and that of diabetes, those persons in whom the symptom is more easily produced being predisposed to the graver condition.

In a discussion inspired by the remarks of Lancereaux upon experimental diabetes from removal of the pancreas (*vide infra*) various opinions as to the proper relationship of these conditions and as to the classification of diabetes were expressed, some of the speakers, as Sée and Lancereaux, regarding diabetes as but a symptomatic affection, and all forms of glycosuria as but degrees of the same symptom; while others, as Semmola, insisted upon the individuality of diabetes mellitus, although separating it perhaps into several forms.

This discussion followed the remarks of Lancereaux<sup>10</sup><sub>Sept. 29</sub> upon diabetes of pancreatic origin before the Academy of Medicine of Paris, upon presenting before that body for his interne, Thiroloix, a dog which had been rendered diabetic by the almost total ablation of the pancreas thirty-five days before. In the first part of the experiment Thiroloix had simply made a section of the organ and removed the vertical portion of it. This was followed by a very marked increase in the excretion of urea and a rapid failure of nutrition, from which, however, the animal soon recovered. In the second phase of the experiment nearly the whole organ was removed, and the usual symptoms of diabetes promptly ensued. In the discussion which followed, Germain Sée stated as his belief that it is not the absence of the pancreatic juice so much as the actual removal of the organ (and possibly it is rather the injury done the sympathetic system in the operation) which determines the establishment of a glycosuria in these cases. The experiments of Hedon,<sup>1</sup><sub>Aug. 1</sub> as mentioned in last year's ANNUAL, point to these conclusions. He states that where the pancreas is entirely removed the animal always becomes diabetic; the symptom of glycosuria is always present, as well as the other phenomena of diabetes. Where, however, the pancreatic juice is prevented from gaining entrance into the intestinal canal by filling up the pancreatic duct with paraffin, or by removing the head of the pancreas, diabetes does not ensue. It appears that the honor of precedence in establishing the occurrence of diabetes mellitus by extirpation of the pancreas should be ascribed to a Neapolitan, de Dominicis, his original announcements having been made in February

and March of 1888, and published in April, 1888,—before those of von Mering and Minkowski. De Dominicis <sup>34</sup><sub>Oct. 13</sub> states that, in his experience, not all those animals from which even the entire pancreas was removed became glycosuric,—in fact, in but two-thirds of the cases was glycosuria established; and it was not at all infrequent that this symptom did not become manifest until more than twenty-four hours had passed after the operation. In these particulars he differs from the published results of von Mering and Minkowski, Lépine, and others. While from his investigations this Italian experimenter finds such a lack in uniformity as to the presence of the symptom glycosuria, this is the only phenomenon not constant in the cases where total extirpation has been practiced. Polydipsia, polyphagia, polyuria, wasting, the presence of various dermatic affections, loss of hair, etc., are all constantly present in the animals upon which he has performed the experiment; so, too, the more important and classical alterations of the liver (diffuse fatty degeneration and atrophy, with cellular vacuolation), the spinal cord (gray degeneration), the stomach, kidneys, etc., were found by de Dominicis to be identical in those animals which exhibited the glycosuria, as well as in those in which this symptom failed. Indeed, if there was any difference in the intensity of these lesions, they were more pronounced in the latter class. The author expresses, further, the following conclusions, which are of importance in connection with the subject of the etiology of the disease: (a) The injection of blood from the portal vein of healthy, flesh-fed animals at the height of digestion produces no diminution in the sugar in the urine of animals rendered diabetic by ablation of the pancreas; on the contrary, for a short time decidedly increases it. So, too, the intra-venous, intra-peritoneal, or subcutaneous introduction of pancreatic infusion does not alter the amount of sugar in the urine of these cases. (b) A severe injury, the same kind of animals being used, diminishes the glycosuria for a few days, unless at the same time the large lymph-vessels (thoracic duct) or the cœliac plexus be damaged; the intra-venous injection of a soda solution produces the same result. (c) The administration of iodoform or saccharin to these animals, agencies by which the amount of urine is often increased two- or four- fold, is not followed by a decrease in the glycosuria proportionately. (d) Upon absolute meat diet or a peptonized diet, as well as in case of prolonged fasting,

the glycosuria of these cases becomes diminished, but never disappears. (e) In the livers of animals which have presented the most marked cases of glycosuria there can be demonstrated a clear iodine reaction for glycogen. (f) Slight wounds of the pancreas and duodenum, in the experiments of the author, induced but a passing and trifling glycosuria. These results of de Dominicis are of exceeding importance, and demand considerable attention, especially in the light of the results published by the French and German investigators. The results of de Renzi and Reale <sup>84</sup><sub>Aug. 15</sub> are corroborative of those of de Dominicis, the ablation of the pancreas not in every instance being followed by the appearance of sugar in the urine (75 per cent.); however, they agree with the opinions of those who assert that the disease, or at least one of its varieties, is caused by the removal of this organ. They further add that similar results may be obtained by removal of the duodenum or the salivary glands.

One of the most important contributions to this department has been the thesis of François Cartier, of Paris, <sup>2061</sup>; <sup>673</sup><sub>Sept.</sub> upon toxic glycosurias, especially that induced by uranium nitrate by its action upon the liver. In the first portion of his work he calls attention to the transient glycosurias arising from toxic substances as resembling in some phase or other diabetes as found in the human subject. While in his opinion there exist certain factors of difference between these glycosurias and diabetes mellitus, particularly in their etiology, the author regards the symptomatology of the latter as to be profitably studied in the light of the development by toxic substances of symptoms which are comparable to those of diabetes in this or that phase. In the first part of the work Cartier reviews a number of toxic agents having the power of producing glycosuria, the glucosides (whose action, as a rule, is to produce symptoms resembling those of mild diabetes), a number of acid substances (whose general symptoms are analogous to those of diabetic coma), and as a third class those substances which act directly on the nervous system, as morphia, strychnia, and curare. Taking up the study of agencies which, while producing glycosuria, have a distinctive action upon the liver, the author calls attention to the very slight causative value hepatic alterations have in the experimental production of diabetes. No lesion or simple congestion of the liver has any direct relation to diabetes. The quantity of the

glycogen in the liver is independent of hepatic lesions and depends primarily upon alimentation. With a toxic substance like uranium nitrate we may produce a grave hepatic lesion characterized by the formation of hyaline casts,—a condition which is present in other poisoned conditions, either natural or due to microbial toxins,—and yet, the ephemeral diabetes which this salt produces, instead of increasing with the progress of the lesion, actually diminishes up to the time of death. Simple congestion of the liver can, in like manner, only be regarded as an accessory cause; for with the same metal, in very minute doses, we can prolong hepatic congestion for a certain number of days, yet the urine will cease to be diabetic after a short time. The gravity of experimental diabetes does not depend upon the amount of sugar present in the urine. The glycosuria induced by uranium, in spite of the decidedly fatal tendency of full doses, is as a rule slight in its intensity; on the other hand, a non-toxic substance like phloridzin may induce the excretion of large quantities of sugar without producing any but the milder symptoms of diabetes, and invariably terminating favorably. It is, therefore, not the glycosuria which, in this or that case of experimentally induced diabetes, determines the severity of the condition; rather is it the manner of origin, the character of the poison producing not only the glycosuria, but also the histological changes, which decides this question. So, in relation to clinical diabetes, we may conclude, from the arguments of Cartier, that the danger in the disease does not exist in the mere presence of sugar in an unassimilated condition in the economy, but in the presence of toxic substances derived from this sugar, which poison the organism, and which probably produce the anatomical lesions recognized more or less constantly in the bodies of diabetics brought to section. When the diabetic patient is delirious or comatose various substances are found in the urine,—alcohol, diacetic ether, acetone, and lactic, acetic, diacetic, formic, crotonic, and  $\beta$ -oxybutyric acids. Further, the renal lesions have been produced experimentally with acetone, but not by sugar; and the author remarks that it would not be surprising if the hepatic lesions were also found to be due to a secondary poisoning. These considerations suggest to the author the question of the nature of diabetes,—whether it is a unique affection with various manifestations, or whether it is but a symptom resulting

from various organic changes; he is inclined toward the former view.

Of the theories which have been offered to explain the establishment of diabetes by the ablation of the pancreas, that of Lépine has occupied the most important position; and, as in the fixation of any theory, so there have arisen a number of objections to this one, all of greater or less significance. Two articles have appeared which pass into the review of the theory and its status, both of which are fairly complete. That of Gallois <sup>June 28, July 1</sup> <sup>14</sup> is perhaps the more favorable to the views of Lépine, regarding the position of this writer as practically established. The excellent *résumé* of Sansoni, <sup>589</sup> <sup>July 10, 17, 18</sup> however, tends to cast a doubt upon this theory of Lépine as to the pathogenesis of the pancreatic form of diabetes, which was based upon the results of von Mering and Minkowski (*vide* ANNUAL, 1891). These latter investigators, it will be recalled, announced that by the removal of the pancreas of a dog it may be rendered glycosuric, the course of the case closely simulating that of the wasting form of diabetes in man, but that in order to do so the organ must be removed almost entirely or altogether. Lépine, working upon this line of thought, confirmed by experiments of his own the results of these investigators, and erected a theory of the pathogenesis of diabetes mellitus, or at least of a large class of cases. He suggested that the pancreas, besides its ordinary functions in alimentation, possesses also a function of producing a ferment substance having the power of breaking up the sugar in the blood in such manner that it may better serve the purpose of nutrition. This ferment substance is not thrown into the intestinal canal with the pancreatic juice, but is delivered directly into the venous blood from the pancreas; hence, as the theory supposes two points of the discharge of the function of the organ, it is sometimes spoken of as the "bipolar" theory of Lépine. According to this view, the alimentation sugar and proteids are carried to the liver in the portal circulation, and in this organ converted into glycogen. This is transformed into glucose, in which form it exists to a greater or less degree in the blood. It is, however, unfit for assimilation as such, and is further broken up by a substance having this especial property and derived from the pancreas (glycolytic ferment). In case of failure of the latter, as in removal or marked disease of the pancreas, the sugar circulates unchanged,

and is excreted by the kidneys. Lépine bases his theory upon the following facts, which he has elicited in his experiments: (a) If glucose be mixed with healthy blood and kept warm ( $38^{\circ}\text{C}.$ — $100.4^{\circ}\text{F}.$ ) for an hour, a very decided diminution occurs in the amount of sugar present in it; but if this be performed with the blood of a dog rendered diabetic by the removal of the pancreas, the diminution amounts to almost nothing at all. (b) If chyle be used instead of blood, this diminution is about twice as marked as with blood. Of the sugar which is ordinarily in the blood, normal blood loses a very perceptible amount if kept warm for an hour; diabetic blood scarcely any. (c) This loss increases with increase of temperature, but at  $51^{\circ}\text{C}.$  ( $123.1^{\circ}\text{F}.$ ) it stops entirely. It is greater in the spring than in the summer. (d) The blood from the portal vein of an animal killed during active digestion loses at least 20 per cent. more sugar in a given time than that from the splenic vein or from an artery of the same animal; while in a diabetic dog the difference and the actual loss are almost inappreciable. (e) Carbonic acid retards this loss, but does not prevent it in normal blood.

Arnaud<sup>Feb. 4</sup> denied the existence of such a glycolytic ferment, attributing the above phenomena to a vital property of the albumens of the blood. Following this refusal to accept the glycolytic ferment which Lépine had suggested, the latter investigator, together with Barral,<sup>211</sup><sub>Jan. 25, Mar. 1, Apr. 25, Oct. 25</sub><sup>15</sup><sub>Aug.</sub> published the fact that, in diabetes mellitus in man as well as in animals, the blood contains a diminished quantity of this substance, and described a method of isolation as well as a method of estimating its intensity. The isolation of this substance is not complete, but is carried to the point of at least separating the glycolytic power from the albuminous substances in the blood. This is done by whirling the blood in some such apparatus as the hæmatokrit, having the centrifugal principle as the basis, and thus separating the globules from the serum. Upon subsequent estimation, the latter is found to possess practically no glycolytic influence, while the globules have this power in an intensified degree. Replacing the serum by salt water and again whirling the mixture, the salt water will be found to contain but very little albuminous matter, but to have acquired a very decided power of sugar destruction; on the other hand, the serum contained a notable proportion of albumen, but had lost all glyco-

lytic power by separation from the globules. By such an argument it would appear that the objection of Arnaud is decisively removed.

The method of estimating the glycolytic intensity of a specimen of blood is practiced by Lépine and Barral as follows: One hundred cubic centimetres ( $3\frac{3}{8}$  ounces) of blood are run into a dish, which is kept below  $15^{\circ}$  C. ( $59^{\circ}$  F.) by being surrounded by cold water. It is defibrinated, and then filtered through a sterilized cloth. Forty grammes ( $1\frac{3}{8}$  ounces) are taken, and dropped into a vessel containing 40 grammes ( $1\frac{3}{8}$  ounces) of sodium sulphate warmed to  $80^{\circ}$  C. ( $176^{\circ}$  F.), in order to suddenly bring the blood to a higher temperature and thus stop glycolysis. The amount of sugar is then estimated by Claude Bernard's method. An equal amount of the remaining blood is then taken and placed in a vessel kept at body-heat, shaken now and then, and left in a warm bath for an hour. It is then subjected to the same process as the first and the amount of sugar estimated. On comparing the amounts of sugar, as determined in these two estimations, it is always found to be less in the second; and the difference between the two in loss of sugar (in one hour) is taken as the expression of the glycolytic power of the blood. In the normal individual this may be reckoned as 25 grammes ( $6\frac{3}{4}$  drachms); in the diabetic it may be as low as 1.6, 3.3, or 5.5 grammes (25, 50, or 88 grains), etc. It is believed by Lépine that this glycolytic power rests in the substance arising in the pancreas, having the nature of a soluble ferment, and that it is carried in the white blood-cells. While, perhaps, the pancreas is the most important source of this substance, it is probably not the only one, certain intestinal glands also possessing either a vicarious or supplementary function.

Shortly after this refutation, Arthus, <sup>410</sup><sub>No. 3</sub> while accepting the existence of a glycolytic power in the blood and of a definite substance having this power, objected that it is a post-mortem phenomenon much like coagulation. Freshly-formed fibrin has, according to the experiments of this investigator, no glycolytic power; but, if it be permitted to macerate in the blood for a few hours before its removal from the mass, it is found to possess marked glycolytic power. In decalcified or defibrinated blood kept at  $40^{\circ}$  C. ( $104^{\circ}$  F.) Arthus found that in the first fifteen minutes the dissolution of sugar was very slight, but in the second similar period it grew more pronounced, and the later, for a time,

the stronger the glycolysis. In answer to this objection, Lépine and Barral<sup>3</sup><sub>Nos. 22, 27</sub> explain the phenomenon described by Arthus, and which they accept as true, by the suggestion that during the earliest period the changes taking place in the blood-mass are not those simply of destruction, but that at the same time there is sugar formation. This results from the unconverted glycogen which the fresh blood contains, and takes place probably from the action of some diastasic ferment also present. These last-named writers state that sometimes in the course of their experiments during this first period of fifteen or twenty minutes there is not only no decrease in the sugar present, but an actual increase. They urge, in this connection, that in all these experiments as to the existence of such a body as they suppose in the blood the character of the diet and the amount of food and time of feeding of the animal employed must all be known, as so much glycogen might be produced from a meal of certain nature that it would obscure all subsequent results.

Recently Gaglio,<sup>589</sup><sub>Feb. 21</sub> working over this same ground, has produced a number of results which must receive careful attention before Lépine's theory may be regarded as established. Having produced diabetes in a number of animals by the extirpation of the pancreas, he proceeded to ligate the left thoracic duct, with the effect that the diabetic symptoms abated. So, too, if the left thoracic duct be ligated and the pancreas then removed, the animal does not become diabetic. Gaglio concludes that the fault causing the glycosuria is not so much the absence of a glycolytic ferment as the presence of something which probably accumulates in the blood and comes from the lymphatics of the intestines. It is likely that this something is not glucose, as the phenomenon may be demonstrated in dogs that have lasted for some days; but perhaps a form of ferment which converts the glycogen of the organs into glucose. This suggestion is strengthened by the fact that von Mering and Minkowski have found a diminution in glycogen in the organs of diabetic animals. As a further objection to the views of Lépine, Sansoni concludes his review by stating that the method of estimating the glucose in the blood which is practiced by Lépine and Barral—that of Bernard—is very unreliable; and he claims that his own results by his gravimetric method, a modification of Bernard's, are more nearly correct. Moreover, these results

do not agree with those of L  pine. He states that in Bernard's method the error necessary is so small and so easily made that in two estimates of the same blood, taking slightly different amounts to work upon, the result in one may be positive and the other negative as to the glycolytic power. For these reasons, he believes L  pine's theory to be inexact in its foundation; and while it may be correct, he does not think L  pine's proof at all positive. De Renzi and Reale,<sup>84</sup><sub>Aug. 16</sub> from the experiments which they have made, are disposed to regard the position of L  pine as correct, and believe that normally there exists in the blood a ferment having the power of destroying glucose (glycolysis), derived in varying amount from different organs, but mainly from the pancreas.

As further corroboration of the pancreatic theory of the origin of many cases of diabetes mellitus, L  pine and Barral<sup>211</sup><sub>Jan. 25, Mar. 1, Apr. 25, Oct. 25</sub> describe a peri-acinal fibrosis in the pancreas in cases dead of the disease; and Lannois and Lemoine<sup>211</sup><sub>Mar. 1</sub> describe an intra-acinous, intercellular, fibrous change in the pancreas in the same class of cases,—not constantly, perhaps, but frequently. That the group of cases usually regarded as the result of lesion of the pancreas may be independent of such lesion, the case reported by Mollard<sup>211</sup><sub>Feb. 15</sub> may be mentioned,—a case of wasting diabetes, in which the pancreas was found in a perfectly healthy condition.

In connection with the subject of pancreatic diabetes, mention must be made of a case described by Toralbo,<sup>589</sup><sub>Mar. 6</sub> under the title of "salivary diabetes,"—a hysterical patient, who presented a marked sialorrh  a, with the presence of sugar in the saliva. The patient, a daughter of a diabetic father and a mother affected with uric-acid diathesis, had, after the death of her husband, acquired a neurosis characterized by a rebellious cephalalgia, blunting of the intelligence, trismus, and catalepsy. After a time these symptoms ceased, but a pronounced melancholy persisted, the patient complaining of bad nights, marked anorexia, but with little wasting, and later to these was added a sialorrh  a. The buccal surface of the pharynx was in no appreciable manner abnormal; no lesions of the salivary glands could be detected. In the space of twelve hours, however, the patient would expel as much as  $\frac{1}{2}$  litre (1 pint) of saliva upon the average. Analysis of this showed a specific gravity of 1019, the presence of albumen and mucus in traces, a normal amount of ptyaline, and about 12 grammes (3 drachms)

of glucose to the litre. Nothing abnormal could be detected in the secretion by means of the microscope. These features, in a general way, persisted for some time; but finally, under the use of static electricity, a slow but decided improvement set in, and the writer now expects a complete recovery in time. The urine at no time contained sugar. This case is of great interest,—occurring in one disposed to diabetes by heredity. The similarity in function and in structure between the salivary glands and the pancreas is a suggestive feature in the same connection. Or, on the other hand, must this phenomenon be entirely ascribed to the presence of a nervous fault? The absence of the classical symptoms of diabetes, the presence of so many undoubted neurotic manifestations, and the improvement under the use of electricity point to the truth of this query, although, even in its isolated position and doubtful appreciation, the case is extremely suggestive. The results of de Renzi and Reale, already mentioned, gain significance when coupled with such a clinical observation as this; and research upon the same line should be prosecuted with the expectation of throwing further light upon the phenomena connected with the formation and assimilation of sugar in the economy. Reynolds,<sup>6 July 25</sup> suggests that the occurrence of glycosuria may be a manifestation of an interruption of the transformation of the proteids into fat. In the early part of the proteid digestion the products are glycogen and urea. From the glycogen glucose is formed; then lactic acid, butyric acid, and, finally, fat. If the process be stopped at the glycogen or glucose stage the excretion of sugar in the urine becomes a feature of the case; if at the lactic-acid stage, rheumatism; if at the butyric-acid stage, dyspepsia.

Little save the work of Cartier<sup>2061</sup> has been done in connection with the part played by the liver in the establishment of glycosuria, but in this connection should be mentioned the investigations prosecuted by Colasanti,<sup>589 Mar. 27</sup> with the purpose of deciding the difference of opinion as to the behavior of the carbohydrates in cases of cirrhosis of the liver. After numerous experiments, he concludes that they are not excreted as sugars by the kidneys, although they are found as such in the serous exudates in the pleural and abdominal cavities. An extended article is published by Kratschmer,<sup>84 Feb. 14 to Mar. 7</sup> reviewing the knowledge of the formation and assimilation of the sugars in the economy, and following

closely the work of Seegen. After this master the writer credits the form of diabetes associated with obesity to the liver, and of the constitutional forms of the disease recognizes but two varieties,—the hepatogenic and the pancreatogenic.

Under the head of diabetes of nervous origin reference is to be made to Mallet,<sup>7</sup><sub>Nov., '90</sub> who reports a case of hæmorrhage into the fourth ventricle. The patient came into the hospital in a comatose condition, and upon examination the urine was found to contain a considerable proportion of sugar. The question arises, Was this a case of diabetic coma, or of coma from hæmorrhage into the fourth ventricle with glycosuria as a result? While the answer is not by any means absolute, the probability of the former supposition is strengthened by the absence of any albuminuria, the presence of an acetone odor upon the breath, and by the abundance of sugar in the urine. Before the London Medical Society, Savage<sup>6</sup><sub>Nov. 29, '90</sub> read a paper upon the relations between diabetes mellitus and insanity, in which in the first place he called attention to the depressed mental condition of diabetic cases. He stated that, as a rule, the diabetic insane are found to be of a melancholic type, and remarked the relation between these conditions in the fact that many cases of diabetes are undoubtedly of central nervous origin. He had not found sugar in the urine at all common among the insane. He presented records of about 40 cases from Bethlem Hospital for the Insane who had diabetic relations, 10 of them having diabetic parents or grandparents, 14 having diabetic brothers or sisters, 12 having aunts or uncles, and 3 cousins suffering from this disease. Besides these there were 12 insane patients who had insane and diabetic relations, and 10 patients who were both insane and diabetic. Nearly all the cases of insane diabetics were affected with melancholia. The patients who had been diabetic and had then become insane had almost all lost some or all of the symptoms of the diabetes during the period of their insanity. There seemed to the writer to be a sort of alternation between the symptoms of the two affections, and he submitted cases in which acute diabetes had been replaced by acute melancholia, this latter again giving place to diabetes, which once more had been replaced by a temporary mental depression. In conclusion, he pointed out that similar causes might give rise to either insanity or to diabetes; that diabetes occurred in the same

families as did insanity; and that there might be an alternation, so that insanity might occur in one generation and diabetes in the next. Again, in diabetes the symptoms, one or all, might be replaced for a longer or shorter time by mental symptoms. A case of diabetes in which, to a certain extent, such alternation of melancholia with diabetes occurred, is reported by Dewees,<sup>801 Feb.</sup> in a woman aged 52 years. Suddenly the urine dropped from a specific gravity of 1038-45 to 1020, all traces of sugar were gone, and the woman has since—several years—been free of both diabetic symptoms and of mental alienation.

As an instance of this disease following the acute infectious fevers may be mentioned the case reported by Magelson,<sup>9 Oct. 10</sup> which developed rapidly and in a severe form after an attack of influenza in a man 33 years of age, previously in excellent health.

Schmitz,<sup>122 May</sup> whose views as to the contagious nature of diabetes were noted in the last edition of the ANNUAL, is disposed to pursue the logical end of his idea, and looks upon the disease as not improbably of bacterial origin. He,<sup>4 July 6</sup> compares it to tuberculosis; as a certain constitution is demanded for the best development of the latter, so, in case of a certain diathesis, the germ of diabetes finds a ready soil for its growth. His opinion that diabetes mellitus is transmissible by contact has found credence with a not unimportant class of the profession,—as Gerhard, of Berlin; Landenberger, Finkler, and Kohlman; and, indeed, the attention which the author has given to the study should urge careful consideration of his views, even at the hands of those least willing to accept them. He has seen 2500 cases of diabetes, studied 2115 of idiopathic diabetes, and is thus in a position to force consideration. Age is usually regarded as a factor in the etiology, and, according to an analysis of Schmitz's 2115 cases, the period of its greatest frequency extends between 30 and 60 years of life (the greatest number fall between 50 and 60 of any of the decades). Diabetes mellitus prevails to much greater extent in some localities than in others; for example, in Malta it is a scourge of more severity even than tuberculosis is in Germany. It is common in Sweden, and very frequent among Jews, wherever they may live. The argument to explain this distribution of the disease usually contemplates the amount of sweets in the dietary of the populace; but Schmitz endeavors to overthrow it by a com-

parison with the Americans. "The Yankees," he says, "have sweets at breakfast, dinner, and supper; day after day they consume vast quantities, and besides, great and small, man and wife, have in their mouths all day long bonbons of candy or chocolate." Nevertheless, he argues, the "Yankees" are not especially the subjects of diabetes,—because, in Schmitz's opinion, they do not have a diabetic disposition.

This disposition he regards as hereditary. In 998 cases of his 2115 he discovered positively that there were, or had been, 1 or 2 cases of diabetes among their blood relations, and in some cases more. In the circles of relationship of diabetes he found especially frequent neurotic faults, as melancholia, morphinism, drunkenness, onanism, etc. He insists, in his argument for an infectious nature of diabetes, that the slight cases of mellituria must be separated from the true diabetes of idiopathic character. The former he regards as syndromic of varied pathological states, and as quite different from the idiopathic variety of diabetes.

Among those who regard the disease as an essentially symptomatic affection is Kállay, of Karlsbad, <sup>57</sup><sub>May</sub>, who compares the disease to the symptom fever. Just as all sicknesses may present fever as a symptom, so disturbances of all organs which have anything to do with metabolism, and especially those which preside over these functions,—the brain and cord,—may lead to the establishment of diabetes mellitus.

*Semeiology.*—F. Hirschfeld, <sup>114</sup><sub>H. 3, 4</sub> from a series of clinical observations, endeavors to construct a new clinical variety of diabetes mellitus. The characteristics upon which he bases this class of cases are: (1) violent attacks of colic early in the course of the affection, diminishing in the latter stages; (2) a urine little increased in amount, apt to be turbid, and to permit the deposit of heavy sediments; and (3) whitish-colored stools, in which, however, one fails to recognize any fatty matter. In this form the absorption of albumens and fats is especially diminished, instead of remaining nearly normal, as in most cases of the malady. The progression of the case, because of the nutritive disturbances, is rapid and grave. One of the principal indications arising from the character of the case is the employment of a dietary rich in albumens, fats, and alcohol. These disturbances of nutrition are doubtless due in part to the altered condition of the gastric func-

tions so often met with in diabetes, although, of course, other organs and the more intimate functions connected with nutrition are undoubtedly even more responsible. On this subject of the functions of the stomach the work of Honigmann<sup>69</sup> is again mentioned. He reports the results of investigations in Riegel's wards, at Giesen, as to the gastric functions in 7 diabetics. The observations were especially directed to the amount of HCl present in the gastric juice during digestion. This, determined by the usual color-tests, was found normal in but 1 case, hyperacidity existing in 3, in 2 absolute deficiency of the acid, and in 1 a constantly varying amount. There was no apparent organic disease of the viscus where the acid was diminished, as might be supposed. No muscular inactivity of the walls could be made out; in fact, rather the opposite,—the food possibly being discharged too rapidly into the intestine, and thus leaving too little chance to be properly mingled with the gastric juice. Possibly this circumstance might explain the lack of acid the author suggests.

Rosenstein's work<sup>4</sup> is also mentioned in this year's literature. His observations are quite similar to those just mentioned, but the conclusions seem more satisfactory. He found in one series of cases that the hydrochloric-acid reaction was quite inconstant, and he is disposed to regard such an intermittent absence as due to a neurosis of the stomach. It does not seem to bear any relation to the severity of the case,—at least, so far as is indicated by the amount of sugar or acetone in the urine. In another series of cases HCl was uniformly absent. Such cases of this series as came to section showed changes of the mucous membrane of the viscus, an atrophy due to interstitial gastritis. It is not at all improbable that the supposition that the stomach should evince the above symptoms as the result of a neurosis as supposed, inasmuch as the affection in its every aspect evinces decided nervous relations. Perhaps the most frequent of the early nervous symptoms of the disease are those in which the affection simulates tabes, especially as relate to the condition of the reflexes. Upon this subject Salomonsen<sup>68</sup> contributes the history of a girl, aged 18 years, affected with glycosuria, muscular weakness of the lower extremities, paræsthesia, shooting pains in the limbs, diminution of the superficial reflexes, beginning ataxia, and cataract. The sensibility, pupils, optic nerve, and sphincter muscles were

normal. The peroneal, crural, and ischiatic nerves reacted only to the strongest faradic current, the muscles supplied by these nerves showing corresponding alterations. Salomonsen explains the absence of the patellar reflex and the other symptoms as due to a polyneuritis due to the diabetes mellitus. This same view is taken by Auché,<sup>6 Aug. 8</sup> who ascribes the loss of the knee-jerk to a neuritis, which also underlies the neuralgias and various peripheral nervous phenomena. He states that this neuritis is to be met with very much more frequently in the lower extremities than in the upper; it is generally bilateral, but may be one-sided. Atrophy and degeneration may appear in the muscles supplied by the affected nerves; and sensory disturbances and vasomotor changes are also apt to be manifest, and accompany motor changes.

It was usually supposed that the neuralgias and other disturbances of the peripheral nervous system were not associated with actual inflammatory changes in diabetes, and the absence of heat and of eruptions was believed to exclude a true neuritis. A number of neurologists,—Ziemssen, Hoesslin, Blau, Pryce, Leyden, Eichhorst, Althaus, Charcot, Buzzard, and others,—however looked upon the question in an opposite light; but Auché, a Bordeaux physician, was the first, in 1890, to demonstrate the effects of neuritis in diabetic nerves,—the vacuolation and destruction of the myelin and disappearance of the axis-cylinders. The clinical symptoms associated are sometimes œdema, at times a glossy skin, perforating ulcer, malnutrition of nails, and even gangrene. Zona has not been mentioned in this category, however, and this is almost certainly the result of a neuritis. Vergely<sup>73 Sept. 26</sup> reports 2 cases of diabetes mellitus in which it was a marked symptom. The first was a man of 51 years of age, powerful build, and good history and habits. His urine contained a moderate proportion of sugar. He was suddenly attacked by a right frontal neuralgia, which was followed by herpes zoster, which left deep seams all along the supra-orbital nerve. The skin became thickened and insensitive to pain, though remaining normally sensitive to touch and temperature. Eventually the case developed albuminuria, and died in a uræmic condition. The second case was a woman aged 43 years, active and of good health until 37. Since then she had had much mental distress, and had developed diabetes. When the sugar percentage had become rather large she was

attacked by a severe neuralgia of the lesser sciatic nerve of the right side, which was accompanied by an outbreak of zona. The latter readily improved, but similar changes resulted to those in the previous instance. Lange, of Copenhagen,<sup>373</sup><sub>No.24</sub> calls attention to violent symmetrical, occipital pains in the symptomatology of diabetes mellitus. They are not so frequent as the pains in the lower extremities, but are more characteristic; Lange has met them eleven times within the last eight or nine years. They occur in the occiput near the attachment of the cervical muscles, often run upward into the temples and down the back of the neck and shoulders. They are fixed pains, of a sore, pressing, aching nature. In an absolutely quiet, fixed condition of the head they are not present, but occur upon any motion, especially on raising the head. As a rule, these patients regard themselves as healthy; 3 or 4 of Lange's series complained of excessive thirst. After several days of antidiabetic diet the sugar is apt to disappear from the urine, and with it the pains from the occiput, not to return. The author looks upon both the glycosuria and the occipital pains as having their origin in a dyspeptic condition, although in general, he acknowledges, there were no signs of such an origin. In the same paper the author mentions the ocular and intercostal pains to be met with, and states also that he has met a number of times with migraine-like pains which, he believes, have some decided relations with true migraine. He mentions pruritus as a nervous symptom of importance. In some cases, in old persons, it indicates recovery, being apt to follow energetic alkaline treatment of the underlying gouty condition. Among other evidences of disturbance of the peripheral nervous system in this affection a spontaneous shedding of the nails is not infrequently met.

The manner of this separation has recently been studied by Auché.<sup>148</sup><sub>Jan.11,18,25</sub> He states that a hæmorrhage takes place into the tissue beneath the nail, detaching it to a greater or lesser extent from its bed. If this hæmorrhage is slight only a slight film is to be found beneath the nail, and this may be absorbed; but if it be greater in quantity it lifts the nail from its bed and separates it all but at the borders. When the new nail has formed beneath, the old one drops off. The author regards the process as due to lesion of the peripheral nerves. He concludes his paper as follows: Diabetes mellitus, like tabes, hysteria, and other affections, may,

and often does, cause spontaneous shedding of the nails of the hands, and even more frequently of the feet. This may occur in one of two ways. In some cases no symptoms of any moment precede the shedding, and it might be difficult to differentiate from a process due to locomotor ataxia or syphilis. In other cases sub-ungual hæmorrhage may precede separation, and the mechanism is similar to that in certain cases of tabes dorsalis. These sub-ungual hæmorrhages are not only due to the vascular and hæmatic changes of diabetes, but also to lesions of the nerves found in the parts.

In articles published within the past few years, Hirschberg has considered the subject of cataract and retinitis as occurring in diabetic persons. A question having arisen upon some of the statements made therein from Professor Schweizer, Hirschberg<sup>69</sup><sub>No. 13</sub> has taken the occasion to publish a *résumé* of the ocular affections of diabetes mellitus, such as are presented in his practice. From 1885 to 1890 the number of patients who had consulted Hirschberg amounted to 7176, of which 113 (1.5 per cent.) were diabetics.

It is not uncommon for diabetics, where the disease lasts any length of time, to complain of ocular symptoms, usually of the lens or retina. Some of these are practically diagnostic of the affection, and to some extent prognostic. Among these are: (a) the purely functional paralysis of accommodation; (b) a myopia coming on late,—from the age of 40 to 60 years,—without opacity of lens; (c) a form of retinitis; (d) double cataract, of rapid appearance, presenting itself in young and wasting patients. They may generally be divided into two classes,—those which are not accompanied by appreciable change in the tissues, and those which do accompany alterations of such a nature. The most frequent is a group of errors of accommodation, weakness, or paralysis; this coming on, as a rule, in the less severe class of cases, is not infrequently amenable to treatment. Diabetic myopia, manifesting itself suddenly in persons of mature age, is rare. A more frequent and more important feature is a weakness of sight, without change of the eye; its prognosis is grave. Hirschberg has seen 7 such cases, and of these 5 have died within a very brief period after observation. Loss of vision on one side is rare, and is incurable. Diplopia is very frequent; often it is the first manifestation of disease. It depends mostly upon a palsy of the oculo-motor. It often

disappears of itself, at other times under the influence of general treatment. The second group comprises the affections of the pupils: furuncles, eczemas, chalazions (which may have diagnostic value when occurring in old persons); hæmorrhages of the ocular conjunctiva; keratitis, of which are two forms,—one characterized by circumscribed ulcers, very rebellious, the other neuroparalytic, connected with a palsy of the fifth pair of nerves; iritis, commonly developing slowly, insidiously, and progressively, sometimes with very notable symptoms, as the exudation of fibrinous matter in the anterior chamber, cataract, opacities of the vitreous, retinitis, and optic atrophy. Cataract in diabetics is to be separated from that of old age. Hirschberg insists upon this, and believes that the practitioner should understand that the diabetic cataract does not decrease when the glycosuria diminishes; that operation is demanded just as in simple cataract; and that a certain amount of opacity of the lens is the rule where diabetes mellitus has lasted some years. The opacities of the vitreous sometimes follow retinal hæmorrhages, at times accompanying retinal changes, and are occasionally coincident with the myopia referred to. There are two forms of retinitis met in this connection,—an exudative and a hæmorrhagic variety. They ordinarily occur at an advanced stage of the disease, and are not always easy to recognize. The optic atrophy may be accompanied with central blindness, or with contraction of the field of vision, or an obscuring of the field of vision and a diminution of the sharpness of the visual centre. This may amount to total blindness; treatment does not influence it. Finally, it is to be recalled that in the same patient a number of these ocular symptoms may be present together.

Magitot<sup>147</sup><sub>June</sub> refers to osteoperiostitis of the teeth as a constant symptom in diabetes mellitus; it is present in the early stages as well as throughout the disease. In the earliest it is manifested by deviation of the teeth; in the second stage, by loosening of the teeth and an alveolar catarrh; in the third, by falling out of the teeth. In advanced cases, if the diabetic process is not checked, absorption of the alveolar process may occur, preceded by gangrene of the gum. The latter has a prognostic value, usually indicating a fatal termination of the disease. Caries of the teeth is also an important symptom in diabetes, probably provoked by the acidity of the secretions in the mouth.

The urinary phenomena in diabetes are not always characteristic in this disease. Bazy, <sup>360</sup><sub>Oct., '90</sub> in a paper upon "true" and "false" urinary diseases, especially those connected with glycosuria, calls attention to a class of cases which might afterward become diabetics, but at the time of earliest recognition present no ill health and no symptoms except a group of ill-defined urinary symptoms and diminished or absent knee-jerk. These urinary phenomena are such as smarting in the urethra, pain at the end of the penis or in the perineum, irritation about the meatus, etc. Pousson, <sup>188</sup><sub>Oct. 11</sub> before the Medical and Surgical Society of Bordeaux, reported several cases of diabetes in which the most marked symptoms were of such indefinite nature. The first was a man aged about 50 years, large and fat, with ulcerations of the prepuce, but without any venereal history to account for the latter. Suspecting an underlying diabetes, examination was directed to that point, with the result of the discovery of a decided amount of sugar in the urine. The second case was a man of 41 years of age, who consulted Pousson for a slight œdema of the prepuce with fissures at its borders. The absence of venereal suspicion led to examination for the presence of sugar in the urine, which was found. The third case was a man of 58 years of age, with contraction of the preputial orifice, its inner surface rough, red, and painful, but not ulcerated; and here, again, other symptoms were elicited to the fulfillment of a diagnosis of diabetes. The fourth case was a man aged 33 years; he had had two attacks of blennorrhagia in his youth, but without arthritic complications. He had an eczema of the leg, and complained of an irresistible desire to urinate at certain times. The urine was slightly burning in the urethra, but in its external appearance seemed normal; so that Pousson scarcely deemed it worth while to examine it minutely. Dyspeptic and certain neuropathic symptoms, of which the patient also complained, continued with such persistence, however, that the urine was finally examined and the presence of a glycosuria determined.

Kühl <sup>375</sup><sub>v. 21, p. 381</sub> calls attention to a number of points which distinguish diabetes mellitus in the child from the same disease in the adult. Thus, in infancy the affection is much more frequent in girls than in boys, while in adults this sex relation is reversed. In children the etiology is largely dominated by a pathological heredity, the parents having been subject to diabetes or to some

nervous malady. Traumatism is not an infrequent cause in the young. In infantile diabetes the glycosuria acquires a marked intensity, and a very grave prognosis attaches to the disease. Its course is much more rapid than in an adult, and, generally speaking, a mild case tends to become changed to a grave form the more quickly the younger the subject.

*Complications.*—One of the most common complications of diabetes mellitus is an albuminuria, doubtless in most instances secondary to the action of a urine rendered irritant by the presence of sugar upon the renal structures. Schmitz<sup>4</sup><sub>Apr. 13</sub> found that in 1300 diabetics in whose urine he sought for the condition 824 were also subjects of an albuminuria. Schmitz states his belief that in a large number of these cases the cause of the albuminuria is probably the excessive amount of eggs consumed in the diabetic diet, whilst in others he regards the albuminuria as symptomatic of some complication, as tuberculosis, cardiac disease, renal inflammation, or a cystitis or pyelitis, depending upon the irritating nature of the sugary urine.

Mallet<sup>7</sup><sub>Nov., '90</sub> reports a case of hæmorrhage into the fourth ventricle, the patient being brought into the hospital in a comatose condition. On examination, the urine was found to contain sugar. The question naturally arises here, whether this was a case of diabetic coma in the course of which the hæmorrhage occurred as a complication, or whether it was a coma from the hæmorrhage into the fourth ventricle with a secondary glycosuria? In favor of the former supposition, the fact of the large proportion of sugar in the urine, the presence of acetone odor upon the breath, and the absence of albuminuria are to be taken as diagnostic elements, although it may not be absolutely regarded that such is the case. Schmitz<sup>4</sup><sub>Aug. 25, '90</sub> recognizes two causes for the appearance of coma in diabetes: (a) weakness of heart's action from the action of sugar on the cardiac muscle; (b) an acute auto-intoxication called (but improperly) acetonaemia. This poison, whatever its nature, arises in the intestines, and is to be combated by free purgation, the stools having a characteristic black, tarry, foul appearance. This form is preceded by a set of symptoms easily mistaken for those of a slight gastric catarrh: as lack of appetite, coming on suddenly; eructations of foul gases, especially in the morning; great sleepiness and weariness, the sleep leaving the patient weary and

heavy-headed in the morning. There is usually constipation, sometimes diarrhœa; the tongue dry and coated, and the breath foul. This continues for several days, the patient getting restless, and groaning in his stupid sleep. Presently the sleeping period becomes prolonged and the pulse and respirations quickened. Colicky pains are apt to occur, and sometimes vomiting of a greenish-colored fluid.

Metzler's investigations <sup>112</sup><sub>July, Aug.</sub> into the physiological properties of acetone, carried out in the laboratories of the University of Pennsylvania, would indicate that such a train of clinical phenomena are not likely to be produced by acetone alone. He states that acetone, when circulating in the blood *in sufficient quantity* (a large quantity), is capable of producing deleterious effects, and finally death. Acetone acts on the whole nervous system. Because of its powerful action on the pneumogastric nerves, it diminishes the frequency of the pulse and lowers the blood-pressure. In poisonous doses it paralyzes respiration. While the opinion of Schmitz upon the subject of the relation of acetone and diabetic coma may be correct, it is undoubtedly correct that, as a rule, the highest degree of acetonuria in diabetes is apt to coincide with the occurrence of coma. The frequency of acetonuria in affections other than diabetes mellitus, unassociated with similar comatose conditions, long since excited the attention of clinicians, and it has been noted that an even more direct relation exists between acetonuria and intestinal disturbances than between the former and glycosuria. Recently, Heinrich Lorenz <sup>114</sup><sub>B.19,H.1,2</sub> has sought to elucidate this relation. He suggests that, in the absence of other appreciable cause, one must refer the various nervous disturbances found in connection with acetonuria to the toxic action of some substance bearing a relation with acetone. Perhaps, as he would suggest, there are other members of the series to which acetone and diacetic acid belong. The variety of symptoms observed, their variation of intensity independent of the quantity of acetone in the urine, show that it is not to this substance that intoxication is due. Often, too, acetone appears or is decidedly increased only when the graver symptoms of the sickness are passed; not infrequently it is noted that such an increase follows the disappearance of an albuminuria, suggesting that the severer symptoms were induced by products retained while the renal lesions were pronounced.

On the other hand, experiments made by producing marked degrees of acetonæmia have given but negative results; and the author is disposed to agree with those who affirm that the comatose and other nervous phenomena of diabetes mellitus are not due to an acetonæmia, as was formerly believed. Lorenz thinks it probable that the poisonous symptoms are rather induced by substances occupying a position before acetone and diacetic acid in the series of chemical products to which these belong. These substances are as yet unknown to us, but they are probably very toxic in their nature. They arise from albuminoid substances as intermediate products in the course of their oxidation to a final metabolite,—acetone. The multiplicity of such products would explain, according to the predominance of one or the other, the variety of symptoms ascribed to acetonæmia. In the normal state these substances are rapidly oxidized and eliminated, while in the pathological condition, seen in diabetes and other affections characterized by acetone, they accumulate, and are not thrown off with the usual readiness. Should a renal lesion also exist the situation becomes dangerous. As to the point of origin of acetone, Lorenz points to the intestine; he has found the substance in the intestinal and gastric contents of all the cases he has examined, except in the nervous affections of the stomach. Faulty chemical change in the albuminoids leads to the formation of acetone in the digestive disturbances met with in most febrile affections and in those leading to inanition. Devoto,<sup>589</sup><sub>Mar. 23</sub> studying the relations between acetonuria and febrile affections, finds that the quantity of acetone in the blood as well as the quantity in the urine is not in relation with the height of the fever; rather is there some relation between an altered state of hæmic alkalinity. Devoto has succeeded in demonstrating its presence in the perspiration. Cristiani<sup>589</sup><sub>Sept. 17</sub> contributes a paper upon the occurrence of acetonuria, albuminuria, and a slight glycosuria in the diarrhœa following degenerative changes in the solar plexus of the abdominal sympathetic nervous system in the insane, corroborating the experimental work of Klebs and Munk, Lustig, Peiper, Viola,<sup>589</sup><sub>Aug. 20</sub> and others. Jansen<sup>378</sup><sub>July 30</sub> contributes a paper upon diabetic coma, in which he describes the two principal varieties: the cardiac or collapsing form and the ordinary variety or auto-toxic form. While he does not say it in as many words, he evidently ascribes this auto-intoxication to the acetone.

A case of fatal diabetic coma coming on suddenly in a man aged 50 years, who had previously shown no apparent symptom of diabetes, is related by Hutchinson<sup>282</sup><sub>Apr.</sub>; death occurred one hundred and twelve hours after the man gave up his work. Sandmeyer, of Marburg,<sup>41</sup><sub>No. 40; June 10</sub><sup>22</sup> states that, from investigation of some 20 cases of diabetes, he has found that in the prodromal period of coma and during coma the urine is apt to contain small quantities of albumen and numerous casts, mostly granular and hyaline, and has also found these casts in the kidneys of those dead of the disease at this period. Külz<sup>84</sup><sub>Oct. 10</sub> also states that, in his experience, the appearance of casts in a diabetic urine previously free from them is an indication of oncoming coma.

Speaking of the influence exerted upon the course of the affection by the pneumonias which complicate it in a number of instances, Merklen<sup>100</sup><sub>May 19</sub> states that he regards pneumonia as a grave, though not necessarily fatal, complication. Pneumonia may hurry off the weak diabetics because of its suppurative and gangrenous tendency, the albuminuric diabetics by uræmia, and cases of the benign or mild form by the intensity of the congestive phenomena and the malignancy peculiar to certain epidemics.

Under the head of gangrene as a complication of diabetes, the following references may be made. Sturgis<sup>99</sup><sub>Mar. 12</sub> reports a case of sloughing of the lip in a man aged 64 years, a diabetic of seven years' standing, in which the slough separated easily and the cavity healed well. The percentage of sugar fell somewhat after the disappearance of the slough; and the salivary function, which had practically been suppressed for three years, was re-established during the inflammatory reaction, and continued thereafter normally. On the whole, instead of, as the rule, leading to a fatal termination, the process left the patient in a better condition than before. Negel and Bogdan<sup>223</sup><sub>No. 4, '90</sub> report a case of multiple gangrene affecting the buttocks and lungs, in the latter probably secondary to the first, in a woman aged 40 years, a diabetic. The case terminated fatally in somewhat more than a week. Partsch, of Breslau,<sup>84</sup><sub>Jan. 10</sub> records the case of a spontaneous gangrene of the toes in a diabetic, which was recovered from under antiseptic and antidiabetic treatment. A month later the gangrene began again in a severer form; the sugar excretion ceased and the amount of urinary excretion diminished. Hæmorrhages from the mouth and intestine

occurred, and the patient finally died in collapse. Microscopical examination showed an extensive endarteritis in the gangrenous toes, with calcification of the middle coat. The author ascribes a prominent rôle to these vascular changes in establishing spontaneous diabetic gangrene, as the sugar in the tissue can scarcely produce sufficient local disturbance to cause it. He remarks that the high amputations now in vogue are in many cases unnecessary, as in most instances less-high operations are sufficient.

*Morbid Anatomy.*—Sandmeyer<sup>34</sup><sub>Apr. 28;</sub><sup>2</sup><sub>June 18</sub> has studied histologically the changes in the tissues of a diabetic, aged 9 years, dead from diabetic coma. There were clumps of degeneration of a glycogenic nature in the loops of Henlé in the kidneys, and fatty degeneration of the epithelium of the tubules of the cortex. The cardiac muscle was in a state of fatty degeneration. In the cervical portion of the cord there was established slight degeneration in the cervical region of the spinal cord in Goll's columns. The pancreas was normal; the liver contained abundant glycogen. Reference must again be made to the publication of Saundby's excellent *résumé*<sup>32</sup><sub>v. 28, p. 129</sub> of the knowledge possessed upon the morbid anatomy of diabetes mellitus, as noted in the last edition of this work. The changes mentioned are, briefly: general nutritive and œdematous changes in the brain; occasionally localized changes in the brain, as cysts of the brain-substance and tumors in the fourth ventricle and medulla; similar changes in the cord; sclerotic changes in the cord; tumors pressing upon the vagus nerve; enlargement and thickening of the sympathetic nerves and ganglia; inconstant and varying lesions in the heart; lipæmia, diminution in the red blood-cells and in hæmoglobin; frequent changes in the lungs, as congestion, congestion with œdema, tuberculosis, and fibrous thickening of the pulmonary vessels; enlargement, fatty degeneration, or cirrhosis of the liver; pale, soft, small spleen, often with glycogen in it; atrophied, sclerotic pancreas; congestive or actual catarrh of the stomach; fatty, enlarged kidneys, hyaline degeneration of the tubular epithelium, sometimes chronic diffuse nephritis, and other minor changes.

It is to be recalled here that the case of M. Mollard,<sup>211</sup><sub>Feb. 15</sub> mentioned above, although a well-marked case of wasting diabetes, and supposed to be due to fault of the pancreas, exhibited, on post-mortem section, an apparently normal pancreas. In the discussion

following this announcement, and the presentation of a paper by Lépine upon pancreatic diabetes, it was well brought forward that these pancreatic changes might not be noted on superficial examination, often consisting of a cirrhotic process quite analogous to the intra-acinous or inter-cellular cirrhosis of the liver. M. Glenard took the occasion to call attention to the fact published last year, that in 60 per cent. of diabetics (300 examined) there were marked hepatic changes, usually enlargement or cirrhosis. An article devoted to a review of the subject of pancreatic alterations in relation to the affection is published by Neve.<sup>239</sup> Colcord, of Topeka,<sup>801</sup> has sought to establish the renal changes in diabetes, and has collected and tabulated the reports of 644 post-mortem examinations of cases of the disease. The condition of the kidneys was carefully noted in 241 of these cases. In the remainder they were reported healthy, or only the gross appearances were noted, as large, soft, œdematous, swollen, etc. Of the 241 cases, 68 are reported as hypertrophic; 52 as hyperæmic; 94 as the seat of a nephritis; 17 as having fatty degeneration; 7 had epithelial accumulation; 2 had cysts; and 1 multiple abscess. These were collected from Geisinger, Myer, Dickenson, Seeger, Burwell, and the Berlin Pathological Institute.

Leva,<sup>326</sup> contributes a paper upon clinical observations in the study of the malady in hand, in which he publishes the records of 9 cases. Four of these cases reached post-mortem examination, and may be mentioned here. The first was a woman, aged 37 years, in Eichhorst's clinic, in Zurich. After an abortion, she was affected by an œdema of the legs, great weakness, insomnia, and anorexia, which afterward gave place to polyphagia. At the same time she began to complain of excessive thirst, a burning sensation in the abdomen, polyuria, and diminution of acuteness of vision. Examination revealed lesions at both apices of the lungs, and bacilli were found in the sputum; the patient complained of diarrhœa. Sugar to the amount of 8 or 9 per cent. was found in the urine; this gradually diminished, but a nephritis of hæmorrhagic type made its appearance, and after several months the patient died in coma. At the autopsy the following lesions were discovered: tuberculosis of lungs and intestines, chronic splenic tumor, acute hæmorrhagic nephritis, atrophy of the pancreas, of the solar plexus, and left supra-renal body. The pulmonary lesions were of

the form spoken of by Leyden as "diabetic phthisis," characterized by absence of miliary tubercles, rarity of giant-cells in the tubercular nodules, and considerable extension of obliterating arteritis. This case also confirms Leyden's statement regarding the absence of hæmorrhages in diabetic phthisis and the rapidity of its development. There was a syphilitic taint in this case. The second case was one of severe type in a man aged 48 years, an exclusive meat diet having failed to influence the glycosuria. Carbonate of ammonium had, it is true, somewhat lowered the degree of glycosuria, but at this time an apical lesion of both lungs rapidly became aggravated and degenerated into gangrene, which quickly terminated the case. The lesions found at the necropsy were: excavations at both apices, surrounded by tubercular nodes, and a double pulmonary gangrene. The fourth case in Leva's list occurred in a young girl, aged 12 years, born of healthy parents. The disease had manifested symptoms about nine months before her admission to the hospital. Beginning without appreciable cause,—by an intense thirst, rapid emaciation, cramps in the calves of the legs,—the patient soon developed intense glycosuria, polyphagia, polydipsia, polyuria, and general malaise. On the fifth day of treatment coma supervened, and death followed two days later. At the autopsy the lesions which were determined were: an atrophied heart, atelectasis of portions of the lungs (deep portions), slight splenic enlargement, enlarged kidneys, and a milky condition of the blood. Finally, in the last case, a severe one, in a woman aged 45 years, an autopsy was obtained and the lesions noted. Under a flesh diet the glycosuria had diminished to some extent, but had not disappeared. The patient presented symptoms of *tabes dorsalis*. After five weeks in the hospital, under an exclusive meat diet, coma set in and the patient died. At the autopsy there were found the following lesions: fatty degeneration of the kidneys and liver, cicatrices marking the positions of old hæmorrhagic infarcts of the kidneys, atrophy of the heart, slight atrophy of the spleen, atrophy of the pancreas, fatty degeneration of the aorta, and hyperæmia of the pia mater. Both in this and in one other (sixth) case coma appeared while an exclusive meat diet was administered, and when the glycosuria was somewhat decreased. In both foci of necrosis of the renal epithelium fatty degeneration of the liver and atrophy of the

pancreas and spleen were noted. According to the author, these lesions are not in any way to be regarded as causative of the coma, however; they are rather the effect of the poison in the blood, due to retention of sugar or some other material. The other cases of this series presented no special point of interest, save that one seemed to have been caused by exposure to cold, although the subject was of neurasthenic heredity and a vegetarian, and presented symptoms of tabes dorsalis; while another became affected by a tachycardia. The author concludes his paper by a reference to the occurrence of the affection in the canton of Zurich, where it is rather rare, but 23 cases being recorded among 33,424 dead of all causes in a space of five years. The disease seems to be somewhat more frequent in the poorer classes, Eichhorst having met it in 6 cases out of 1000 dispensary patients.

*Treatment.*—In the medicinal treatment of diabetes mellitus no drug has received as much attention during the past year as jumbul (*Zyzigium jambolanum*). Villy, <sup>67</sup><sub>Jan. 30</sub> under the guidance of Dujardin-Beaumetz, and following the classification of the latter, has made a study of the value of jumbul in diabetes. His conclusions may be stated as follows: His results, while favorable, are not such as to justify, in his opinion, the enthusiasm of the Anglo-American profession as to the merits of this drug. In average cases with or without azoturia, in the fatty form of diabetes mellitus, in arthritic cases where the glycosuria persists, moderate doses may be employed with benefit, always, however, insisting upon a regulated diet. This latter point is absolutely necessary, and under these conditions the sugar will soon disappear in many cases; to return, however, on leaving off the drug. Tolerance may be established, it is to be feared. In severe cases the results are entirely negative. As soon as a regulated diet is of no avail, all adjuvants—and this among them—also fail. This applies to the dried and powdered seeds, not to the fresh plant; whether the latter is of more value, experiments in India must determine. The author recommends the powdered seeds in divided doses, amounting to 150 to 320 grains (9.92 to 20.74 grammes) in the twenty-four hours. Where an ordinary course of diet is followed, Villy believes that jumbul had best not be administered at all, as in his experience, instead of diminishing the glycosuria and azoturia these are actually increased and the polyuria persists.

Posner, of Berlin, <sup>34</sup><sub>Apr. 23</sub> has for some time made quantitative analyses of every sample of urine passed by several diabetic patients for periods of ten days. In 1 severe case, on a mixed diet, the sugar excretion diminished very sensibly; it regularly came to its maximum shortly after breakfast and about 5 or 6 o'clock in the evening. The fluctuation curve on the chart marking the sugar excretion was very decidedly modified by large doses of jumbul, the maxima and the amounts of these maxima becoming much less marked, but the sugar did not at any time disappear from the urine. Lewaschew <sup>4</sup><sub>Feb. 23</sub> reports 2 cases in which jumbul was employed as a remedial agent. The results were so similar that he details but 1 case. After the administration of sufficient dose, 5 to 10 drachms (19.44 to 38.88 grammes) in twenty-four hours, there was noted within a few days a diminution in the amount of sugar as well as of the urine, a decrease of thirst, and an amelioration of the other diabetic symptoms. The improvement continued for some time after the withdrawal of the drug; there was no complete disappearance of the sugar from the urine at any time. Lewaschew urges, in the employment of jumbul, that larger doses be used, as he is persuaded that many of the failures recorded are due to insufficient dosage.

Audubert <sup>26</sup><sub>Apr.</sub> reports excellent results in several severe cases of diabetes—in which diet did not seem to in any way influence the intensity of the glycosuria—from the use of creasote in doses of 20 centigrammes ( $3\frac{1}{10}$  grains), afterward 30 ( $4\frac{3}{5}$  grains), then 40 centigrammes ( $6\frac{1}{5}$  grains) daily. The glycosuria steadily decreased under the use of this remedy, and that in 1 case in spite of the fact that the patient, having despaired of cure, had deliberately neglected all diet instructions. Cuthbertson, of Chicago, <sup>139</sup><sub>Mar.</sub> narrates 5 cases of glycosuria of more or less intense degree (4 of which were in women), all of which were materially benefited by arsenic. He reviews the opinions of a number of therapeutists as to the mode of action of the drug in this disease, and suggests the following theory as more fully explaining, to his mind, the improvement seen clinically, in a number of cases, at least. Arsenic, according to the writer, may be regarded as having a twofold action,—first upon the stomach, intestines, and respiratory organs (so that where these organs are involved in the primary cause of the disease it may be influenced by their cure), and, secondly, upon the red

blood-cells, by which their activity is increased, enabling a more rapid oxidation of the sugar in the blood. Whatever else may be said of this theory, it is worth at least as much as many others in the field of medical science. Sympson<sup>15 Aug.</sup> publishes the favorable results obtained from the use of sodium salicylate in a diabetic patient, a youth aged 17 years, with a bad family history of tubercle. Under the influence of an antidiabetic diet and sodium salicylate the sugar rapidly diminished, and finally entirely disappeared. Sympson is disposed to believe that in this case there was an excess of uric acid in the blood, which irritated the liver structure and caused an abnormal transformation of glycogen into glucose; and the salicylate possibly did good by leading to an increased excretion of the irritant. Referring to Lépine's view of the origin of diabetes from an alteration of the pancreas and its function, the author suggests that possibly the good effects may be due, in some measure, to a stimulation of the pancreas by the salicylate. Allen<sup>282 May</sup> publishes the notes of a case of diabetes in a woman 62 years of age, who had been suffering for several days from vomiting. The temperature the first week was elevated; the following week subnormal. There was a pronounced glycosuria, and such nervous phenomena as hyperæsthesia, weakness of the limbs, and several mild convulsive seizures. Codeia was given, and, combined with antidiabetic diet, resulted in removing the glycosuria in a comparatively short time.

Witherspoon,<sup>61 12 May 9; May</sup> in a paper of general scope upon diabetes, stated that his experience led him to prefer codeia in the treatment of the affection, and next ergot. He expressed himself as unfavorably disposed to the use of such drugs as antipyrin, sulphonal, etc., as the large doses necessary to affect the diabetic process are sometimes productive of decidedly alarming symptoms. Casarelli,<sup>53 Jan. 10</sup> states that sulphonal exerts a favorable influence in the disease, gradually lowering the degree of the sugar excretion. The amelioration is evident after the remedy has been used for several days in daily doses of 2 grammes (4 drachms). No evil consequences had been noted in his experience, even after prolonged administration, save slight lethargy and delirium, and these ceased immediately if the drug was withheld for a day or two. The author has found antipyrin less satisfactory than sulphonal. Pousson<sup>188 Oct. 11</sup> especially referred to the value of antipyrin as a remedy

in diabetes; in the cases mentioned he had obtained very flattering results, the glycosuria and the other symptoms promptly and markedly diminishing under the use of the drug. In the discussion following in the Medical and Surgical Society of Bordeaux, other members—Arnozan, Armaignac, Venot, and Saint Philippe—expressed themselves in favor of the drug in diabetes. At the following meeting, however, <sup>188</sup><sub>Oct. 13</sub> Armaignac presented the report of a case which did but poorly upon the remedy, the excretion of sugar increasing somewhat during the period observed. Vergely, while acquiescing in the views expressed as to the favorable influence exercised by the drug, stated that he found that the gastric intolerance manifested by a number of cases prevented its continuance. Gullen <sup>39</sup><sub>July 1</sub> reports favorable results from the employment of bromide of arsenic ( $\frac{1}{4}$  grain—0.016 gramme) in a case of diabetes, a man 24 years of age, the sugar diminishing decidedly and the specific weight falling from 1050 to 1032. The drug, however, led to great irritability of the gastric mucous membrane, and had to be discontinued. Catillon, <sup>3</sup><sub>Apr. 22</sub> after speaking of the position of glycerin in relation to the alcohols generally, and of its physiological properties as a member of the alcohols (a triatomic alcohol), said, before the Therapeutic Society of Paris, that empirically glycerin has been employed in diabetes mellitus for a number of years, but that in his opinion it has no direct effect upon the glycæmia, as has been supposed. Its influence in the affection should rather be attributed to its action upon the formation of urea, lowering it in quantity; upon the respiratory functions, by increasing the carbonic acid expired; upon the digestive symptoms, especially by overcoming constipation. Its action is thus directed toward almost all of the prominent symptoms but the glycosuria.

Dujardin-Beaumetz, <sup>3</sup><sub>Mar. 14</sub> from therapeutic considerations, divides the affection into three classes: (a) mild cases, where the glycosuria entirely disappears under treatment; (b) average cases, in which this symptom diminishes, but never disappears under such circumstances; and (c) severe cases, where treatment has no effect. These prognostic symptoms established, one may put these questions: 1. On what basis is the dietary to be arranged? 2. With what rigor and for how long a time shall it be maintained? 3. Are there any medicaments which may alone lower the severity of the glycosuria? As to the first of these questions, it may in a

general way be said that the sugary and feculent food-stuffs are to be removed from the dietary, and to be replaced by fatty matters as equivalent nutrients. In relation to bread, Dujardin-Beaumetz prefers the gluten-bread, as soya-bread is so unpalatable. He would proscribe the stimulating alcoholics, but would permit tea, coffee, and the like. As to the duration of the period of dietary régime there cannot be any set rules made, each case being a law unto itself. It is best to practice urinalysis often, and, where the diet has a favorable influence, to continue it. If it has not altered the excretion of glucose at all, there is not so much occasion for its continuation. The question of drugs is bound to present itself prominently in every case. In some cases there are drugs which will lower the glycosuria or cause it to disappear entirely: as lithium in rheumatic diabetes; bromide of potassium and antipyrin in certain nervous cases; and, finally, quinine, jumbul, and the warm alkaline waters and arsenical waters often have a beneficial effect. Where the medicine and diet are having an effect it is always well to avoid strong emotional disturbances, and exercise is to be practiced, but not immoderately. Commenting upon this line of treatment, as set down by Dujardin-Beaumetz, Duhomme<sup>3</sup> Mar. 11, Apr. 20 stated his belief that in the simple glycosurias (those cases termed mild cases of diabetes by Dujardin-Beaumetz) the adherence to a troublesome and in the main non-strengthening diet is unnecessary; that in some of the severe cases of diabetes it is of undoubted service. Referring to the cure of the disease, Duhomme asks the very pertinent question, "When may a diabetic patient be said to be cured?" It is true that usually a case is so regarded when the glycosuria disappears; but if a slight indiscretion is committed, neglect of an idiosyncrasy occurs and the symptoms often recur. Moreover, simple diminution of the sugar in the urine is not to be regarded as always a favorable prognostic symptom, as it sometimes immediately precedes the approach of coma.

In a further paper, Dujardin-Beaumetz<sup>175</sup> July details the treatment of diabetes, dividing the measures into three classes,—alimentary treatment, nervous treatment, and diathetic treatment. In the first he considers the various foods in their relations to the affection; in the second the combating of the nervous elements in the causation and symptomatology of the malady by such agents as bromide of potassium, sulphate of quinine, acetanilid, exalgin, phenacetin,

antipyrin, etc.; in the third the use of lithium and arsenic and the alkaline waters in the treatment of an arthritic factor. He gives an outline, which may be varied with the case, and which may with profit be included here:—

1. After breakfast and dinner, in a glass of alkaline water (Vals, Vichy), a dose of carbonate of lithium (5 grains—0.32 gramme), to which 2 drops of Fowler's solution have been added.
2. At the same time antipyrin (15 grains—0.97 gramme), in a cup of black coffee, with or without saccharin to sweeten.
3. Rinse the mouth and clean the gums with:—

R Acidi boric,	. . . . .	gr. clxxv ( 11.24 grammes).
Acidi phenici,	. . . . .	gr. xv ( 0.97 gramme).
Thymol,	. . . . .	gr. iv ( 0.27 gramme).
Aquæ,	. . . . . q. s. ad	f℥xxx (900.00 grammes).

Adde :

Tr. anisi,	. . . . .	f℥iiss ( 0.16 gramme).
Essentiæ menthæ piperitæ,	. . . . .	gtt. x ( 0.66 gramme).
Spts. rectific.,	. . . . .	f℥iij ( 81.00 grammes).
Cochenillæ,	. . . . .	q. s. for tinting.—M.

4. Daily sponging of the whole body with tepid water and cologne-water, followed by frictions with a rough glove or towel.
5. Strict observance of the following dietary: (a) An exclusive diet composed of eggs, flesh of all kinds, fowls, game, mollusks, crustaceans, cheeses, fish. All the green legumes, except beets, carrots, and turnips. Fatty foods are recommended: as sardines in oil, smoked herring, bacon and lard, goose-fat, rilette, ham, pork and krout, kaviar. As soups: cabbage-soup, bouillon of boiled eggs, onion-soup, thin soups. No bread or pastry to be added to the soups. As a substitute for bread: gluten-bread or soya-bread, or fromatine, or a measured amount (25 grammes—6 $\frac{1}{4}$  drachms) of crust of bread, or 100 grammes (3 $\frac{3}{8}$  ounces) of baked potatoes. Instead of sugar saccharin may be used for sweetening; kola, coffee, and tea may be permitted. (b) To be avoided: all feculent substances, pastry, bread, panada, macaroni, sugar, sweetmeats, chocolates, confectionery, all fresh fruits, *saucés au roux*, and fixtures *à la farine*; milk is not allowed, except in small amounts. (6) *Drinks*: wine diluted with Vals or Vichy water; little or no pure wine; no liquor or brandy. (7) Daily and regular exercise; all forms of exercise are favorable in their influence,—walks in the open air, fencing, gardening, joinery, etc.

De Renzi and Reale, <sup>84</sup><sub>Aug. 15</sub> in the case of dogs rendered diabetic experimentally, found that the glycosuria was diminished on feeding them with meat, peptone, and calf's pancreas, but did disappear completely in only two dogs by feeding them with fresh, green vegetables, or with pure inulin. Sulphonal, phenacetin, antipyrin, and drugs of that class were found utterly valueless in controlling the glycosuria in dogs rendered diabetic by experiment. Clinically, the experience of these writers shows that a mixed diet, composed of fresh, green vegetables, meat, eggs, fish, cheese, etc., is to be preferred in the treatment of diabetic patients. Bufalini <sup>26</sup><sub>Nov.</sub> states that, in a mixed diet, thymol and naphthalin are valueless in the treatment of diabetes, but that when the diet is properly restricted they very sensibly diminish the excretion of sugar. He is especially impressed with the value of codeia and morphia, however, especially when combined with the restricted diet of Cantani and alkaline waters, such as Vichy, Vals, Carlsbad, and Collali. The last named is an Italian water, and, in the writer's opinion, is an excellent member of the list of alkaline mineral springs. Under its use he has seen most satisfactory improvement in the patients' health and a reduction in the amount of sugar excreted; the most restricted diet seems to be better borne in conjunction with it; and it is believed to have some influence in preventing the formation of toxic substances in the urine, causing coma. The diet commended by Cantani, and employed by the writer, excludes all bread and everything which might contribute a carbohydrate,—gluten-bread among the rest; beefsteaks, and mutton, roast fowl, eggs, sausage, and bacon are permitted. As beverages, he allows wine, well diluted with the Collali water.

The treatment outlined by Pavy, in his address before the International Medical Congress held in Berlin in 1890, and mentioned in the last year's edition of the ANNUAL, is republished. <sup>557</sup><sub>Jan.</sub> The course recommended by this authority was of the broadest kind, and the medicinal and dietary directions are in no especial point peculiar, and not further noteworthy. The alimentary treatment of diabetes—the choice and administration of foods—is carefully considered, and the knowledge upon the subject well reviewed in articles by Chéron, <sup>17</sup><sub>Oct. 8</sub> Paul, <sup>3</sup><sub>Apr. 8</sub> and Lewis. <sup>82</sup><sub>Dec. 13, '90</sub> The work of Purdy, noted in the last edition of this publication, is made to do

further service, in that the author's views in relation to diabetic breads and milk are republished.<sup>43</sup><sub>Apr.</sub> The author has found so little satisfaction from the many so-called "diabetic breads" said to be free from starch that he is disposed to use ordinary bread in diminished amounts of known quantity, as he prefers this to unknown amounts of starch in the "gluten" breads. Soya-bread he regards as a substitute which, in the future, may be valuable, and which may be looked to to take the place of ordinary breads. It is highly nutritious, and contains a minimum of starch. In mild cases of the affection milk is not an undesirable adjunct to the dietary, but in severe cases it has usually been attended with unsatisfactory results. Carles<sup>188</sup><sub>June 7</sub> recently devoted a lecture before his class to a description of the methods of making diabetic or gluten-breads. He acknowledges that the washing of the flour, while in small amounts sufficient to free the mass from starch, fails utterly in large quantities of flour. Therefore, all the preparations on the market claiming to be "gluten" breads, free or nearly free from starch, are in reality necessarily full of starch. It is characteristic of the best brands that the bread should be exceptionally light and full of spaces from the action of the ferment; in order to reach their proper condition, they should be well baked. It is well known from ordinary clinical observation, as well as laboratory experience, that the stomach does not well bear any substance in a condition of absolute purity; that it best retains and is least irritated by a mixture of the food principles; that, where several food elements given in purity tend to create decided disturbances, a mixture of the same, in the proportions of ordinary diets, is quite acceptable. Therefore, the author does not believe that the presence of starch in these gluten-breads is such a decided drawback as is generally supposed; and he would therefore not hesitate to recommend these substitutes for ordinary bread. He makes it a rule to select a bread for each case, not necessarily because of the small proportion of starch in it so much as—providing it be at least partially deprived of the starch—that it should be easily masticated, well baked, appetizing, nourishing, easily borne by the stomach, and in general that causing the least proportion of glycosuria. This last can only be decided after a thorough trial and frequent analysis of the urine, as a due analytical care for the bread, are demanded, in order to come to a worthy decision.

Messrs. G. Van Abbott & Sons, of London, Eng.,<sup>131</sup><sub>Mar.</sub> publish an analysis of the bread made from soya-bean flour. According to this report there are contained 25.02 per cent. of nitrogenous matter, 2.72 per cent. of starch, and 4 per cent. mineral matter. In texture it is said to be like any ordinary whole-meal bread, and it possesses quite an agreeable taste. Wright,<sup>2</sup><sub>Apr.11</sub> in his "Grocer's Research Scholarship" lecture upon the relation of the sugars to diabetes mellitus, divides them clinically into three classes: (a) innocuous; (b) hurtful; (c) mixed. The innocuous sugars include those that are levogyre, as levulose and inulin; the hurtful, maltose and dextrose; and hence, also, cane-sugar and milk-sugar which are mixed. Such sugars as galactose are uncertain, and require further study. In the choice of sugars in diabetic cases he recommends the members of the first group, or such a small amount of the second class as may be entirely assimilated. As to the other carbohydrates, all the starches and dextrins are to be regarded as in the same class as the harmful sugars, and are to be used only in such quantity as may be assimilated. Ireland,<sup>257</sup><sub>May</sub> a manufacturer of gluten-flour, cautions the profession to be careful to prohibit absolutely the consumption of apples or cider, as he has encountered very serious results following the eating of apples by diabetic patients.

The influence of the alkaline waters upon many cases of diabetes, especially those in whom hepatic disturbance can be demonstrated, is well and favorably known. Fremont, of Vichy,<sup>3</sup><sub>Apr.1</sub> believes that the good effect of these waters is due to their action in correcting failures in assimilation and in oxidation of the food elements, albumens, as well as sugars, stimulating the assimilation and increasing the oxidation. Kopf, of Marienbad,<sup>57</sup><sub>Feb.16</sub> writes of the favorable results obtained by the use of the waters at that resort. He claims to favorably influence a large portion of the patients who come under the hydrotherapy of the place.

The dosimetric plan of treatment is outlined by Castro,<sup>229</sup><sub>Oct.</sub> who regards the nutritive disturbances and the underlying alteration in the trophic influence of the nervous system as the main point against which the efforts of the therapist must be directed. The faults of nutrition demand, in his view, the fulfillment of three indications for treatment: (1) by supplying materials capable of improving the condition of the blood; (2) by stimulating the functions of assimilation by acting through the nerves; and (3)

by improving the digestive functions, so as to supply an abundance of materials that are easily assimilated and elaborated. The first of these indications may be carried out by means of the arseniates of sodium, potassium, or iron (2 to 3 granules, three times daily); the second by arseniate of strychnine and phosphoric acid (2 granules of each three times a day); and the third by quassin and pepsin (2 to 3 granules of each at every meal). For the prominent symptoms, which the writer characterizes as secondary diseases arising during the advanced period of the disease, a large number of remedies is recommended, as codeine for polydipsia and polyuria, hyoscyamine for the polyphagia, muriate of morphine and leucin for vomiting and diarrhœa, podophyllin for the constipation, arseniate of strychnine for the impotency, etc.

Dealing with the troublesome pruritus of icteric and diabetic patients, M. E. Besnier<sup>993</sup><sub>May</sub> deals with the treatment by indicating certain internal and external measures. Internally he suggests the use of opium or chloral, given with caution, particularly where there is any hepatic affection prominent. Externally he advises calmativæ applications, as acid lotions and oils, as a flannel compress saturated with a solution of atropine (1 to 500), covered with a sheet of oiled silk. Where the itching is especially located upon the mucous surfaces, an ointment of cocaine (1 to 30 vaselin) may be advantageously employed; where it is general, lotions of boracic acid or vinegar, followed by powdering with borax, or inunction with a glycerole of carbolic acid, or similar substance. In making up a bath in these cases Besnier uses at least 1 litre (1 quart) of vinegar.

As above mentioned, Schmitz recognizes cardiac weakness and a form of auto-intoxication, arising from absorption of deleterious substances from the intestines, as underlying diabetic coma. In the treatment, therefore, he would advise, as a prophylactic measure, that all cardiac excitements, as hill-climbing, stair-climbing, early rising, excessive worship at the shrines of Venus and Bacchus, and all depressants, as bromide of potassium, narcotics, and the coal-tar products, be avoided. Nutritious and easily digestible food, a moderate amount of alcohol, fresh air,—these are to be obtained,—along with the treatment directed against the prime factors of the disease. Where the coma seems rather to be due to a species of auto-intoxication the use of purgatives is indicated;

and under such treatment quick relief is to be expected after the removal of black, tarry, foul stools. Reynolds<sup>90</sup><sub>Aug.</sub> suggests that, in those cases where the patient may be roused, it is better to make him drink large amounts of salines than to inject them into the circulation directly. He mentions several cases in which he had the patient drink, within the period of a day or a day and a half, from 1 to  $1\frac{1}{2}$  gallons (4 to 6 litres) of water and 1 ounce (30 grammes) of a solution containing 30 to 60 grains (1.94 to 3.89 grammes) of citrate of potassium every hour, in each case followed by a disappearance of the comatose symptoms. The course he advises is, in outline, absolute rest in bed, purgation (but not to an excessive degree), a slight relaxation of the diabetic diet, large doses of citrate of potassium, and very large quantities of fluid taken internally. These may consist of milk, lemonade, tea, water, or even barley-water, a variety being necessary in order to induce the patient to take a sufficient total quantity, which should amount to nearly 1 gallon (4 litres) in twelve hours.

## FEVERS.

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ASSISTED BY

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## INFLUENZA.

*Bacteriology*.—Kirchner<sup>58</sup><sub>Dec. 27, '90</sub> has found a diplococcus that in some respects resembles the pneumococcus described by Fraenkel and in others that described by Seifert. It differs from the pneumococcus in not staining by Gram's method, and from the organism described by Seifert in possessing a capsule that stains with gentian-violet or with carbol-fuchsin and Löffler's alkaline methyl-blue. In view of the propagation of influenza in 1890, from Russia as a centre, Baillièrè<sup>211</sup><sub>June 7</sub> alludes to the fact that a streptobacillus, similar to that described by Seifert and Jollés, was found in the drinking-water of Moscow. Associated with this germ, which was thought to be characteristic of the disease, are found other parasitic elements, namely, the streptococcus, the staphylococcus aureus, and the pneumococcus, the character of the symptoms being determined by the prevalence of one or the other form. In reviewing the subject, Baillièrè notes that Bouchard has found the ordinary bacterial elements in connection with influenza, namely, the staphylococcus pyogenes aureus, the pneumococcus, and the streptococcus; Jollés, the encapsulated diplococcus, afterward described by Netter and Herring; and Klebs, the flagellate body found in the blood (a hæmatozoon). The majority of authorities look upon the encapsulated streptobacillus as the characteristic organism. Roux<sup>211</sup><sub>Aug. 9</sub> has detected the presence of a streptococcus in the blood when the fever is at its highest, but has shown that the presence of the organism is not constant, at least as a streptobacillus; he considers the characteristic organism as polymorphous, exhibiting differences that account for the varying phases of the disease, though usually appearing as a diplo-

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coccus. Teissier and Fraenkel, in experimenting with the diplococcus found by Roux and Pittion,<sup>211</sup><sub>Sept. 20</sub> have found that the organism is pyogenic, and that the pus obtained from an abscess of the ear of a rabbit that had been inoculated and prepared by Gram's method contained neither streptococci nor staphylococci, while bouillon cultures of the pus in twelve hours developed motile diplococci resembling those that were originally injected into the ear. In one drop of this culture treated by Gram's method the diplococci were decolorized, and no other micro-organisms were detected. Nakahama<sup>200</sup><sub>v. 10, p. 97</sub> examined the sputa of 30 patients suffering from influenza. In 27 cases staphylococci and streptococci were found; in 7, the encapsulated bacteria (the streptobacillus of Roux). Staphylococci and streptococci occasioned no reaction in animals, while the encapsulated bacteria induced a slight effect in rabbits and proved fatal to guinea-pigs. By cultivation the virulence of the encapsulated bacteria was gradually diminished, and, after cultivation for four weeks, of two guinea-pigs that were inoculated but one died. After cultivation for four months the bacteria entirely lose their virulence. Although the encapsulated bacterium is different from Friedländer's pneumococcus and from Fraenkel's pneumobacillus, it was found to be quite similar to that discovered by Nichroff. Adler<sup>150</sup><sub>May 15</sub> concludes, that the specific of infection (a microbe as yet not definitely described) first invades the blood, since on this hypothesis alone can we account for the acute appearance of the symptoms and the affection of the organism, simultaneously, in every part.

*Epidemiology.*—Arcularius<sup>150</sup><sub>June 15</sub> dates the beginning of the 1891 epidemic in New York from March 20th and its subsidence on May 10th. The development of the epidemic was slower than that of 1890. The various classes of society were equally attacked. Those who by their occupation are supposed to be less prone to attacks of "cold" showed no immunity. The tendency to relapse was more marked than in the previous year. The majority of those attacked in 1891 had already suffered during the previous epidemic. The period of incubation appears to have been more protracted during the epidemic of 1891. Masterman<sup>26</sup><sub>Sept.</sub> thinks that, "from the extraordinary and rapid extension of influenza over nearly the whole of the habitable globe and its contemporaneous appearance in widely separated regions, it is most proba-

ble that some atmospheric condition must have induced it; and from the observation of Asmann and Masson, extending over the whole of Europe, we gather that from the date of the invasion to the height of the epidemic—from the beginning of November to the third week in January—the meteorological records are characterized by high barometric pressure; very little rain; little moisture in the air; rapid evaporation from the earth; the prevailing winds, N.E. and N.N.E.; sky generally cloudy; dry soil; diminution of ozone; and low electrical charge of the air. In Paris, Berlin, Vienna, and Brussels there was noted an unusually high barometer, the curves of the mortality and high pressure being coincident. Singularly enough, however, this is not the case in Russia; and in Paris the prevailing winds were S. and S.W.; but in every case the air was extremely dry, and yet there was very little sunlight, the dull, cloudy skies everywhere intercepting it.” Van Rensselaer<sup>216</sup><sub>Apr.</sub> calls attention to the fact that in both of the recent epidemics the course of the spread of the disease has been influenced by natural obstacles, such as mountain-ranges and seas. He writes: “In those countries hemmed in by these safeguards—Spain, Italy, England, and the Balkan States—it appeared among the last, and finally reached Norway. It did not seem to spread to the latter country from Sweden, which was early attacked, but by the way of Denmark, its course having been checked by the intervening mountains. To America and other foreign countries it was evidently brought by steamers. Once having entered cities, it first attacked those who congregated in great numbers in large buildings, as in post-offices, banks, schools, factories, and soldiers. Men were generally attacked earlier than women, and, in general, those of an out-door life than those of sedentary habits. From all these facts it seems probable that human beings act as hosts for the germs, giving them off to their fellows, and that the epidemic is not a miasmatic, but rather a contagious miasmatic, or a purely contagious disease.” Parsons<sup>2</sup><sub>July 11</sub> maintains that attacks of influenza do not occur simultaneously over large tracts of country, and that it has never been proved that the disease travels faster than men can travel. He claims that the apparently sudden and wide-spread outbreak can be accounted for by the failure of diagnosis in the early cases. In the official report to the Local Government Board he<sup>6</sup><sub>July 11</sub> further considers the probability of true influenza being

always prevalent as ordinary catarrhal fever in a form of mild intensity in the interval between the more violent outbreaks, and of epidemic occurrences being simply due to certain conditions that give to an ordinary semi-specific contagion unusual virulence and rapid dissemination. Baillièrè <sup>211</sup><sub>June 7</sub> cites Griesenger (1860) as the first to include influenza among the infectious diseases. Even before this Graves had looked upon the disease as a general specific affection, while Monneret and Fuster considered it simply a catarrhal affection. Parsons <sup>2</sup><sub>Aug. 8</sub> dates the appearance of influenza in England from the end of February. Cases were first reported at Hull, which seemed to be the starting-point of the epidemic. In the United States, influenza occurred epidemically in Chicago early in March, and in New York early in April. Its prevalence in Russia has not been reported, although on April 24th cases were reported as present in the towns of Southern Russia, and on May 15th it was reported as epidemic in Russian Poland.

Willis <sup>2007</sup><sub>July 10</sub>; <sup>224</sup><sub>Sept. 12</sub> suggests that the disease may take its rise from the intrusion into the atmosphere of some poisonous gas of such density as to penetrate everywhere.

Dubrulle <sup>363</sup><sub>Aug. 1</sub> expresses himself unequivocally as to its contagiousness. The prominence of nervous phenomena suggests the etiologic existence of a poison that acts directly upon the nervous system, in consequence of a primary infection of the blood. The part played by the ordinary micro-organisms found is probably subordinate, and secondary to that of the specific organism of influenza, which Dubrulle, by analogy with malaria, concludes to be a hæmatozoon.

*Contagion.*—Townsend <sup>51</sup><sub>Jan.</sub> reports a case of congenital influenza. Catarrhal symptoms were observed in an infant immediately after birth. There was elevation of temperature, the highest point being 104° F. (40° C.), although there were no abnormal signs found in the chest. The mother was just recovering from a well-marked attack of influenza at the time of her confinement. Crendiropoulos, of Smyrna, <sup>87</sup><sub>Aug. 31</sub> places the period of invasion at from three to six days, and, in a report of a number of cases, emphasizes the probability of spread by contagion. Courrent <sup>100</sup><sub>Aug. 20</sub> recounts a typical case of contagion, in which a lad, recently exposed to infection, was sent by his parents from school to a village that had been entirely free from cases of influenza. On

the way to his destination the boy was seized with headache and lassitude, and during the course of the next four days suffered from symptoms markedly characteristic of the disease. At the end of the fourth day the young girl that nursed him was also affected; and the disease spread from her to the other members of the family, affecting, in succession, those that were most directly exposed to the contagion; and finally the disease became prevalent throughout the village. The period of incubation appears to have been four days. Gwynne<sup>6</sup><sub>Aug. 29</sub> concludes that the period of incubation is variable. Weber<sup>150</sup><sub>May 16</sub> speaks of the epidemic of 1890-1891 as without any period of incubation, and is strongly opposed to the theory of contagion, because of the occurrence of the disease simultaneously in widely separated localities, and because of the immunity of certain regions in direct communication with infected districts. Arcularius<sup>150</sup><sub>June 16</sub> states that the longer incubation period of this year favors the theory that the disease has spread by miasmatic infection. Although it appears that the first invasion and the early progress depend upon a miasm, contagion effected the spread from house to house after the first appearance of the disease in a community. From the preponderance of the catarrhal symptoms, Parsons<sup>6</sup><sub>July 11</sub> recognizes the probability that the poison of influenza finds entrance into the system by means of the air-passages. At the same time Thorne<sup>6</sup><sub>July 11</sub> alludes to the capillary congestion of the conjunctivæ as a strong evidence of the conjunctiva being the structure generally attacked by the infecting material. He admits that the infecting material acts most pronouncedly on the cerebro-spinal nerve-centres.

*Duration.*—Gwynne<sup>6</sup><sub>Aug. 29</sub> has observed that, of 200 cases, 58 were convalescent in five days or less; 73 recovered within between five and ten days; 21, between ten and fifteen days; 16, between fifteen and twenty days. He includes in the last group cases with some one of the usual complications, such as pneumonia, bronchitis, pleurisy, etc. The duration of well-marked cases of influenza in children has been observed by Mackenzie<sup>90</sup><sub>Aug.</sub> to be very short. In 6 carefully-observed cases the febrile stage lasted only twenty-four hours.

*Mortality.*—Parsons<sup>2</sup><sub>Aug. 8</sub> estimates the number of deaths in London to be primarily attributed to influenza, during the thirteen weeks ending July 4, 1891, to be equal to a ratio of 1.9 per 1000

inhabitants. He states that "the epidemic in London of the present year has been more protracted and more fatal than that of 1890, though it seems to have been less sudden in its incidence." The Indians of Alaska were reported <sup>59</sup>June 20 as dying in large numbers during the past year. In Austria 2823 deaths from influenza were reported <sup>59</sup>May 23 during the epidemics of 1889 and 1890; 930,478 applied for medical relief, but of course a large number did not call in a medical attendant. Lee <sup>53</sup>Jan. 24; <sup>61</sup>Mar. 14 reports 1,120,000 cases in Pennsylvania during the recent epidemic, of which 7880, or 1 in every 142, died.

*Symptomatology.*—Arcularius <sup>150</sup>June 15 alludes to the preponderance of cases in which general prostration was complained of over those in which the more localized neuroses occurred. The absence of catarrh of the air-passages and of gastric disturbance, after the subsidence of the fever, was noted. James Mackenzie <sup>90</sup>Aug. refers to the throat symptoms (inflammation of the fauces, with purulent exudation from the follicles of the tonsils) in the early cases of an epidemic at Burnley in April and May. He also alludes to the disproportion between the degree of febrile disturbance and the sensation of chilliness and heat, these sensations being extremely marked when the temperature was raised but a degree or two. Squire <sup>6</sup>July 11 calls attention to the occurrence of tonsillitis with the fever, having an average duration of four days and appearing as a prominent symptom. Thompson, <sup>81</sup>Aug. in describing the influenza as it prevailed in Northern Texas, alludes to an abdominal variety, the attack beginning with great pain in the abdomen, relieved only by large doses of morphine. Crendiropoulos <sup>87</sup>Aug. 31 refers to several cases of an intermittent form, in which the morning remissions, ordinarily observed in the course of the disease, were unusually marked. Weber <sup>150</sup>May 15 has observed the frequent occurrence of delirium and typhoid symptoms, also neuralgic and rheumatic disturbances, as sequelæ. In 2 cases he encountered deafness, with sudden rupture of the tympanum, after persistent congestion and pain in the side of the head corresponding to the affected ear. Clevenger <sup>760</sup>July 26 reports a case in which the patient, a Swedish sailor, developed symptoms of inco-ordination and paraplegia. Nystagmus and tremor of intention were present, so that the case resembled one of multiple cerebro-spinal sclerosis. Convalescence was attended by protracted exhaustion, but recovery

ultimately ensued. Clevenger cites a similar instance observed by Landon Carter Gray. Gwynne<sup>6</sup><sub>Aug. 29</sub> found that the temperature in uncomplicated cases usually ranged from 100° to 103° F. (37.8° to 39.5° C.), the mean being from 101° to 102° F. (38.3° to 38.9° C.).

*Pulmonary Complications.*—Acute bronchitis, according to Bruce,<sup>6</sup><sub>MAY 30</sub> is a common complication of influenza in the present epidemic,—more common than in 1890. It may be an early symptom, or so late as to be called a sequela, or at any rate to be attended with a recrudescence rather than a relapse of the fever. There may be more or less objective dyspnœa, until, in the worst cases, the patient sits up, gasping for breath, and finally may perish of asphyxia. Occasionally, bronchitis drifts into broncho-pneumonia, patches of consolidation developing over the lower lobes posteriorly, with crisp râles, bronchial breathing, and bronchophony. As far as his experience goes, there are three differentiated types or varieties of pulmonary inflammation in connection with influenza. The first is an ordinary well-developed acute croupous pneumonia; the second is a very curious ill-developed pneumonia, popularly called “congestion,” apparently croupous pneumonia in the stage of engorgement, where the exudation never becomes completely solid; and the third, broncho-pneumonia following bronchitis.

Morehouse<sup>257</sup><sub>Mar.</sub> states that inflammation of the lungs was usually fatal in his practice when it occurred as a complication or followed an attack of influenza. Catarrhal pneumonia was the form most usually encountered, and it appeared to be a gradual and insidious extension from the tubes to the air-cells; but the most fatal and distressing form was pleuro-pneumonia, coming on with violent and distressing pain at the very onset, the patient appearing to be stricken from the beginning, as though from collapse. Ornstein<sup>69</sup><sub>Nov. 27, '90</sub> maintains, in opposition to those who hold that every pulmonary complication, as capillary bronchitis, lobar pneumonia, and catarrhal pneumonia, are consequences of the more or less energetically active poison, that the infecting agent, through its depressing effect upon the nervous system, influences the resisting-power of the organism to the heterogeneous sources of infection that may be present. Crendiropoulos<sup>87</sup><sub>Sept.</sub> has recorded the case of a farmer 30 years old, in whom an attack of influenza

was followed by the development of symptoms and physical signs of pneumonia, on the twelfth day of which pain in the right hypochondrium was superadded. The area of hepatic percussion dullness became increased; febrile movement persisted, and profuse sweating, with irregular chills, occurred; emaciation progressed, and the patient died. At the autopsy, in addition to hepatization of the lung, a large abscess of the liver, containing about 1 quart (1 litre) of pus, was found. It is believed that the attack of influenza was followed by an invasion of pneumococci, with the development of pneumonia, subsequent lodgment in the liver giving rise to the formation of the abscess found after death.

*Intestinal Complications.*—The digestive organs, according to Nicholson,<sup>69</sup><sub>Mar.19</sub> are frequently affected. Vomiting is often present, especially in the commencement. Diarrhœas occur in 8 or 10 per cent. Atonic dyspepsia, from which the patient may have been free for years, is often revived. The occurrence of diarrhœa, accompanied with fermentation and flatulence, has been noted by Patton.<sup>19</sup><sub>May 23</sub> This form of diarrhœa has also been an accompaniment of pneumonia during the past epidemic.

*Genito-Urinary Complications.*—Currie<sup>199</sup><sub>Aug.</sub> reports that he has repeatedly observed orchitis accompanying influenza. Both testicles are usually affected, and are very painful. Frazer,<sup>6</sup><sub>June 27</sub> reports a case of influenza complicated by acute nephritis. A bacteriological examination was made, in the expectation of finding the pneumococcus which had been found in the urine of influenza patients by Jollés.

*Mental and Nervous Complications.*—Kirn<sup>57</sup><sub>Aug.16</sub> divides the mental disturbances incidental to influenza into two groups: (1) those occurring in the febrile stadium of the disease, namely, the so-called febrile delirium and the more protracted febrile psychoses; (2) those appearing after the subsidence of the fever, namely, the asthenic psychoses, present sometimes in the form of melancholia and sometimes in the form of mania, the former of these two predominating. He considers the cases of paralytic and hysterical psychoses, as well as those of paranoia, as incidences of primary affection which have become manifest during an attack of influenza or as the result of such an attack. He looks upon the exciting cause of all of these affections as a product of infec-

tion,—a toxine,—influencing the nervous system conjointly with the fever or in the presence of psychic predisposition.

Schmitz<sup>295</sup><sub>B.47,H.3,4</sub> has reported 8 cases in which psychoses developed. In all, symptoms of melancholia predominated. He considers the prognosis generally favorable. Richardson<sup>6</sup><sub>May 16</sub> has recorded 2 cases of acute mania in the course of influenza. One occurred in a girl 15 years old, of whom the father had presented melancholic tendencies and a paternal aunt had been insane, while an elder sister had had an attack of acute mania, from which she had recovered, and a second sister had had an attack of melancholia, in which she died. The second case occurred in a woman 30 years old, without hereditary taint, who had suffered anxiety and grief in consequence of the illness and death of a child. In both cases improvement took place. Railton<sup>6</sup><sub>Oct.10</sub> has recorded the case of a girl 6 years old, without neurotic or psychotic family history, in whom hysteria developed after an attack of influenza, in the course of which consciousness was lost for ten days. During convalescence it was observed that the girl made no attempt to walk or to talk. She was conscious, but apathetic. When the hands were extended they were involved in tonic spasm. The girl cried a great deal, with a laryngeal whine. She was quite insensitive to the pricks of a pin. When lifted out of bed and held up under the arms, she held the lower extremities at right angles to the trunk until compelled by physical exhaustion to allow them to fall. There were no evidences of organic disease.

Bristowe<sup>2</sup><sub>July 4</sub> reports 2 cases of abscess of the brain. In the first the attack occurred, the usual symptoms of malaise and myalgia existing in a marked degree, followed by severe pain in the back of the right thigh. The subsequent train of symptoms was as follows: convulsions, pain and throbbing in the head, right hemiplegia, and coma, ending in death. The autopsy disclosed the existence of an abscess the size of a small orange in the left hemisphere, occupying the posterior and upper part of the frontal lobe and the adjoining part of the parietal lobe. In the second case, in a girl of 14, the headache, which had been present in the acute stage of the attack, persisted during convalescence, growing more and more intense, and becoming complicated by uncontrollable vomiting. These symptoms, unaccompanied by delirium or convulsions, continued until death, which occurred on the nineteenth

day from the beginning of the attack. An abscess the size of a small orange occupied the right occipital lobe. In neither of these cases were the ears diseased, and there was no condition present to explain the origin of the abscesses. Bell <sup>56</sup><sub>Apr.</sub> has reported a case of neurosis of the pneumogastric nerve, with annoying salivation, a sense of fullness and pressure in the stomach, with pain, palpitation, and difficulty in breathing. Multiple neuritis after influenza is reported by Westphal <sup>6</sup><sub>Jan. 10</sub>. Two cases are described. In one the first symptoms were manifest seven days after the beginning of the disease. The first patient was 29 years old. He complained first of a feeling of numbness and pain in his toes and fingers, subsequently of weakness of the limbs and difficulty of swallowing, abolition of the knee-jerk and the triceps-jerk, retention of the abdominal and the plantar reflexes, with slight paralysis of the right side of the face. Under appropriate treatment symptoms promptly disappeared, but the knee-jerk remained absent for several months. The symptoms in the second case were more severe, and were ushered in by an attack of urticaria. In the course of a few weeks there was general muscular weakness, paralysis of one side of the face and paresis of the other, difficulty in swallowing and abolition of the knee-jerk, pain on pressure over the affected nerve-trunks, and wasting of muscles both in the upper and lower extremities, the reaction of degeneration being preceded by an increased electrical irritability. Two similar cases are reported by Homen <sup>54</sup><sub>No. 9</sub> <sup>6</sup><sub>May 9</sub> as occurring in brothers. King <sup>6</sup><sub>June 18</sub> mentions a case in which extreme head-pain, with acute vomiting and constipation, was followed by squint, dilated pupils, stupor, and an epileptic attack. All passed off, and the boy is now quite well. In 1 case, a semi-cataleptic condition occurred. Colley <sup>69</sup><sub>p. 1166, '90</sub> reports a case of Basedow's disease as a sequel. A case of attempted suicide during an attack of influenza has been reported by Creagh. <sup>6</sup><sub>July 11</sub> The patient was suffering from the pulmonary form of the disease, and was seized with the maniacal impulse while his temperature was only 101.5° F. (38.6° C.).

*Aural Complications.*—July <sup>37</sup><sub>Apr.</sub> calls attention to the unusual frequency of ear affections during the recent epidemic, and mentions the occurrence of hæmorrhage as a frequent symptom, accompanied and followed by violent pain. Lee <sup>187</sup><sub>July</sub> states that a catarrhal inflammation affects the auditory structures, beginning usually at

the pharyngeal opening of the Eustachian tube, and rapidly passing up that canal into the cavity of the tympanum, where, in most cases at least, its pernicious energy is spent on the tympanic membrane, and does not pass to the important adjacent structures. He has seen no case in which the inflammatory process extended into the labyrinth, the early rupture of the drum aiding in averting such an accident. Ménière <sup>37</sup><sub>Sept.</sub> <sup>5</sup><sub>Feb.</sub> states that aural complications are the result of retranasal affections. Of 57 cases, 23 lasted four or five weeks. In 11 cases the lesion was unilateral, in 17 bilateral. In another series of 16 cases, 9 were unilateral and 7 bilateral, and the duration of the disease three months. Eight lasted four months, and 5 were still under treatment because of complications, as periostitis and mastoid inflammations. Ludwig <sup>328</sup><sub>Sept., '90</sub> found otitis subsequent to influenza sometimes a malignant and life-threatening disease, which, in conjunction with pyæmia and meningitis from empyema of the frontal sinuses, presents the most frequent cause of death after pneumonia.

*Ocular Complications.*—Ingals <sup>61</sup><sub>Oct. 10</sub> observed inflammation of the cornea as a complication, usually confined to one side, and of two types: one, in which a zigzag line of superficial ulceration appeared at some point at the periphery of the cornea and traveled toward the centre; another, in which the surface of the cornea showed no disturbance, but in which focal illumination revealed small, round, grayish spots, localized in the deeper layer of the epithelium. In these cases the conjunctiva, although affected, did not show the characteristic zone of intense hyperæmia around the cornea. Macnamara <sup>82</sup><sub>Sept. 19</sub> has met 4 cases of optic neuritis, 3 in males. Five cases of retro-ocular neuritis are reported by Éperon. <sup>59</sup><sub>June 18</sub> Three cases of ocular complications are reported by Ray, <sup>224</sup><sub>July 4</sub> and Hausen <sup>13</sup><sub>No. 2</sub> describes a case of acute retrobulbar neuritis. Laibach <sup>13</sup><sub>Mar.</sub> reports the case of a young lady, who suffered from influenza with severe hemicrania dextra, whose eyelashes on the right eyelids turned perfectly white. Tenonitis following influenza is reported in 4 instances by Fuchs. <sup>8</sup><sub>No. 11, '90</sub> <sup>5</sup><sub>Jan.</sub> In 2 of the cases the pneumococcus of Fraenkel-Weichselbaum was found in cultivations made from the secretions. One case went on to suppuration.

*Miscellaneous Complications.*—Cazaux <sup>35</sup><sub>June 10</sub> has recorded a case of laryngeal paresis affecting the posterior crico-arytenoid muscles. Mijulieff <sup>132</sup><sub>Oct.</sub> noted that, in women menstruating during an attack of

influenza, the flow was more profuse and prolonged. In a case of amenorrhœa the flow re-appeared after an absence of four months; in another it appeared for the first time during an attack. The increased flow must be explained as due either to an acute endometritis or to the presence of pathogenetic micro-organisms in the blood introduced through the respiratory tract. These give rise to certain vasomotor disturbances, which may lead to hæmorrhages in other organs besides the uterus. It is possible that the microbes may generate ptomaines, which exert a direct irritant action upon the vasomotor system. Gibson<sup>2</sup><sub>June 13</sub> has reported several cases of hyperpyrexia in the course of influenza. One occurred in a man, in whom the temperature rose as high as 108.4° F. (42.3° C.). Despite energetic antipyretic treatment, including baths and acetanilid, the man died, unconscious. Another case occurred in a woman, 21 years old, recently delivered of a child. The temperature rose to 108° F. (42.2° C.); it was but little influenced by antipyrin, acetanilid, or quinine, and only temporarily by cold baths. Death took place, the temperature being 107.4° F. (41.8° C.). In an infant, 3½ months old, with influenza, the temperature rose to 105° F. (40.6° C.), but was reduced by cold bathing, with ultimate recovery. Two cases of apyrexial influenza are reported by Godfrey.<sup>2</sup><sub>July 4</sub> In both cases the patients were suddenly seized with marked nervous symptoms, delirium and pain in the head being the most prominent, in addition to the subnormal temperature range.

Johannsen<sup>21</sup><sub>No. 46, '90</sub> has recorded a case of gangrene of the foot during the course of an attack of influenza complicated by acute nephritis. Upon amputation, the arteries were found occluded by thrombi. Johannsen also observed phlegmasia alba dolens, in a girl of 15 years, during an attack of influenza. Influenza in children presented but few complications,<sup>150</sup><sub>May</sub> the most frequent appearing to be general swelling of the lymph-glands, notably cervical, the axillary and inguinal glands, after the subsidence of the fever. This swelling was not painful, and in no instance did it progress to suppuration. In most cases it disappeared in from one to three weeks, the disappearance of the swelling being often accompanied by a slight rise in temperature incident to the process of resorption. In all of the cases enlargement of the spleen was observed. The writer considers this occurrence as illustrating a special localiza-

tion of the infecting principle. Fiessinger <sup>55</sup><sub>Sept. 12</sub> reports a case of acute infectious endocarditis, complicating influenza, in a child of 4 years, who, after the acute symptoms characteristic of influenza, suffered from fever that continued without remission for sixteen days. On the seventeenth day a harsh, systolic murmur was detected over the apex. This was followed by intermittent pulse, cyanosis, and death on the twenty-fourth day.

*Sequelæ.*—Neuralgia has been observed by Adler <sup>150</sup><sub>May 15</sub> to be the most frequent sequela, especially in children. The following nerves were affected in the order of frequency: (1) trigeminal; (2) sciatic; (3) intercostal. In one case he observed intercostal neuralgia with herpes. Subacute rheumatism appeared to attack the smaller joints. Moyer <sup>202</sup><sub>Aug. 25</sub> has not, in any instance, found that influenza is responsible for nervous affections comparable in severity to those following diphtheria or the exanthemata. He concludes that influenza is not a microbic disease, but due to prevalent meteorological conditions. Brosset <sup>211</sup><sub>Mar. 15</sub> presents the notes of a case of multiple neuritis following influenza. The commencement of the disease in the peripheral nerves leads him to conclude that the affection is not of central origin. He rejects the possibility of the disease being a result of rheumatism. Priester <sup>84</sup><sub>July 4</sub> describes a case of nona following influenza. One month after a slight attack the patient began to suffer from severe pain in the occipital region and in the back of the neck. This was soon followed by somnolence, but was unaccompanied by disturbances of motility or sensibility. It became more and more difficult to rouse the patient. Recovery gradually took place, convalescence beginning in the sixth week after the accession of the attack. In a discussion of the affection called nona, Ebstein <sup>57</sup><sub>Oct. 18</sub> reported the case of a woman, 53 years old, who, while under treatment for digestive derangement, suddenly became delirious and subsequently soporose. The attack was repeated a second and a third time, the patient not awakening from the last. At the autopsy there was found no evidence of a cerebral lesion. The intestines and the spleen presented appearances characteristic of an infectious disease. Although the patient gave no history of influenza, it is possible that nona represents an infectious sequel of unrecognized influenza. Jolly <sup>69</sup><sub>Mar.</sub> summarizes the results of a study of the psychic disturbances following influenza, with a view to ascertaining the causal

relation of the disease to the symptoms observed by him. He concludes that we are right in assuming that influenza is responsible for none of the cases of true psychoses, inasmuch as in 104 cases he found only 21 in which neither hereditary tendencies nor alcoholism nor neurotic temperament were absent.

*Prophylaxis.*—Manby<sup>6</sup><sub>May 16</sub> advises isolation in the prophylactic treatment of influenza. He says: "Hitherto we have relegated influenza to the limbo of diseases impossible to be dealt with by isolation, and with no attempt to minimize the quantity of poison diffused. Even while not attempting to isolate measles and whooping-cough on a large scale, we still often succeed in preventing their spread within the narrow limits of a dwelling, and by so much limit their further spread."

Prophylaxis has been successfully carried out by Gilbert<sup>6</sup><sub>June 20</sub> by the use of quinine and arsenic. He used these remedies in a number of patients, none of whom were attacked. He observed one instance where 9 children in one family were attacked, and 1, who was taking arsenic for a skin affection, escaped. He thinks it reasonable to suppose that these two powerful antiseptics might prove inimical to the development of the microbe which probably causes influenza. It is also reasonable to expect that these drugs would fortify the system against the disease.

Goldschmidt<sup>4</sup><sub>Dec. 8, '90</sub> observed a marked immunity from influenza among the inhabitants of Madeira who had been recently vaccinated. Owing to the outbreak of variola, many of the inhabitants were vaccinated; in the epidemic of influenza those that had been vaccinated remained free, while those that had not been vaccinated were rapidly infected. Goldschmidt suggests this fact as an explanation of the comparative infrequency of influenza among children. In confutation, Bienfait<sup>577</sup><sub>Apr.</sub> has presented a series of cases among the employés of the railroads centring in Reims. He shows that, of 241 cases of influenza, 86 had recently been vaccinated.

*Treatment.*—Wallian<sup>9</sup><sub>Apr. 25</sub> considers an efficiently managed Turkish or Turko-Russian bath at the onset one of the promptest measures at command. It relieves congestion, causes rapid elimination, and equalizes the circulation. Few patients are too weak to bear this measure. The sick-room should be free from curtains, plush furniture, etc.; should be large, airy, and should be perfectly disin-

fectured with peroxide of hydrogen, which should be thoroughly sprayed about the room every two or three hours. It not only disinfects, but liberates free oxygen in an extremely active or ozonized condition. Add to this free and frequent inhalations of pure oxygen to the extent of 15 to 25 gallons (60 to 100 litres) per day.

The treatment of influenza neuralgia by sweat-baths is discussed by Frey.<sup>69</sup><sub>Mar.19</sub> He used simply steam- or hot-air baths, and found the best results in the ordinary typical forms of neuralgia and in recent cases. He explains the good effects by the increase in the body-temperature and in the force of the circulation, as a result of which oxidation is increased to such a degree that the micro-organisms in the blood are deprived of their proper nutriment, and are affected by the increase of carbonic acid.

Weber<sup>150</sup><sub>May</sub> relied upon rest and expectant treatment to avoid complications. Thompson<sup>81</sup><sub>Aug.</sub> states that quinine sulphate has no apparent effect in modifying the course of an uncomplicated attack. Ingals,<sup>61</sup><sub>Oct.10</sub> on the contrary, found that quinine had a decided effect in relieving the neuralgic symptoms. Kinsman<sup>222</sup><sub>Aug.</sub> has reported a case of influenza, complicated with hydrothorax and general dropsy, in which the fatal result was precipitated by the excessive use of antipyrin. The depression following the acute attack of the disease is in part attributed by Patton,<sup>19</sup><sub>May 23</sub> to the administration of large doses of antipyrin, phenacetin, and antifebrin, and the exhaustion following the last epidemic (notably more marked than in the epidemic of 1889-90) to be due to the increased use of these remedies. In the treatment of diarrhœa in influenza salol proved useful in his hands; for gastric fermentation, thymic acid,  $\frac{1}{2}$  grain (0.032 gramme), and charcoal, 5 grains (0.32 gramme).

Bigelow<sup>121</sup><sub>May</sub> recommends a mixture of antipyrin and salicylic acid, to be followed by a pill containing iron and nux vomica. Childs<sup>207</sup><sub>Feb.</sub> reports a case in which acetanilid had been given in doses of 25, 15, and 10 grains (1.62, 0.97, 0.65 gramme), respectively, within twenty-four hours, with toxic effect,—cyanosis, syncope, subnormal temperature, and excitement. Marotte<sup>70</sup><sub>June 21</sub> has found ammonium chloride superior to quinine in the pulmonary form, and strongly recommends its use. The employment of camphor as a general sedative has been advocated by Long.<sup>2</sup><sub>Aug.29</sub> Stillwell<sup>779</sup><sub>July</sub> expresses his opinion in favor of opium, 1 grain (0.065 gramme),

or morphine,  $\frac{1}{6}$  grain (0.011 gramme), administered at the onset of the attack, together with the use of a warm bath; these measures to be followed by a mild cathartic, preferably calomel. Turner<sup>6 July</sup> advocates the administration of large doses of salicin, 20 grains (1.3 grammes), every hour. Johnson<sup>176 June</sup> reports rapid relief from the headache and the general nervous and digestive symptoms from the employment of copper arsenite in doses of  $\frac{1}{100}$  grain (0.00065 gramme).

The following prescription is very highly recommended by Palmer<sup>130 Aug., '90</sup>:—

R Salol,	.	.	.	.	.	.	.	℥ij (3.89 grammes).
Phenacetin,	.	.	.	.	.	.	.	℥ij (2.59 grammes).
Quininæ salicylat.,	.	.	.	.	.	.	.	℥j (1.3 grammes).
M. et fiat caps. no xx.								
Sig.: One every three hours.								

Emerson<sup>130 Aug. 1</sup> has found nothing better as an antipyretic and analgesic than phenacetin, or phenacetin and salol in combination. He gave 10 grains (0.65 gramme) of phenacetin, or 5 grains (0.32 gramme) of phenacetin and 5 grains of salol, or 2.5 grains (0.16 gramme) each, every three hours, for a day. It is rarely necessary after that time.

Phenacetin is warmly recommended by Clemow,<sup>2 June 27</sup> who has used it in from 4 to 10 grains (0.26 to 0.65 gramme). The second dose is given an hour after the first, and repeated every four hours if the patient is not relieved. Similar results are reported by Henry.<sup>2 June 13</sup> Laffont<sup>59 Apr. 11</sup> advises, as a rational treatment, gentle fumigations, diaphoretics and revulsives, and strong tonics.

That influenza is a paresis, or partial paralysis of the pneumogastric nerve, depending probably on such a sudden change in the atmosphere as involves an increased expenditure of force in maintaining circulation and respiration, is the idea advanced by Morris.<sup>61 Jan. 3</sup> Hence follow the phenomena of heart-failure and pulmonary congestion, gastro-intestinal troubles, or intense neuralgias. He finds, as a logical sequence, that the best remedies are strong excito-motor stimulants, chief among them strychnine, caffeine, alcohol, and ammonia. Since he has treated his patients with 5- to 10-drop doses of tincture of nux vomica every three or four hours, he has often been surprised at the promptness and almost unfailing success of the method. In otitis with serous exudation Michael, of Hamburg,<sup>37 Apr.</sup> thinks paracentesis useless or

injurious; but Politzer<sup>37</sup><sub>Apr.</sub> maintains the opposite view. Johnston<sup>36</sup><sub>Aug.</sub> coincides with the opinion of the latter.

## GENERAL CONSIDERATIONS ON FEVER.

*Heat Production and Heat Dissipation in the Normal and Febrile States.*—Carter<sup>242</sup><sub>Dec., '90</sub> gives the results of experiments on rabbits, cats, and dogs, which seem to demonstrate the non-existence of any diurnal rhythm of heat production and heat dissipation, though a distinct rhythm of temperature was evident; the maximum occurring in the evening, the minimum in the morning. The maximal and minimal of heat production and of heat dissipation are not synchronous with the maxima and minima of animal temperature. As the temperature rhythm occurred in animals that had been starved, and as it has been observed in those who sleep by day and work at night, it is concluded that it must be due to nervous influences, and probably to the activity of thermotoxic centres.

*Danger of High Temperature.*—Maurel<sup>3</sup><sub>Sept. 23</sub> states that he has experimentally been able to demonstrate that a temperature of 44° or 45° C. (111.3° to 113° F.) would destroy leucocytes in a few minutes, that at a temperature of 43° or 44° C. (109.4° to 111.3° F.) leucocytes would not live an hour, and that at a temperature of 42° or 43° C. (107.6° to 109.4° F.) leucocytes would preserve their activity for three hours, while if the temperature were lowered their vitality would be preserved for twelve hours. As an animal cannot survive the destruction of its leucocytes and the axillary temperature is a degree or a degree and a half lower than the internal temperature of the body, the danger of an axillary temperature of over 41.5° C. (106.6° F.) is obvious. Should this temperature reach 42.5° or 43° C. (108.5° to 109.4° F.), it becomes fatal to the leucocytes and to the individual. This knowledge equally explains the advantage of a reduction of a degree or two in febrile temperature, the leucocytes thus being restored to activity instead of undergoing destruction.

*Relation between High Temperature and the Degree of Alkalinity of the Blood.*—The results of the experiments of Wittkowsky<sup>273</sup><sub>B. 28, p. 283</sub> demonstrate that the elevation of temperature resulting from puncture of the brain is not associated with a reduction in the proportion of carbonic-acid gas in arterial blood. Its reduction in

the blood of rabbits, the temperature of which is artificially raised by detention in a warm chamber, is explained by the increased frequency of respiration and increased pulmonary transpiration. The diminution observed in the course of septic fever does not bear a causal relation to the elevation of temperature.

*Production of Heat in Fever.*—As a result of a series of experiments with rabbits, in which pyrexia was produced by injections of tuberculous sputum, infusions of hay, etc., Rosenthal,<sup>4</sup><sub>Aug.10</sub> by means of air-calorimeter, has demonstrated that, while the temperature was rising the dissipation of heat by the body was diminished. The calorimetric experiments also failed to show that, during the onset of the fever, there was any increased production of heat.

*The Significance of High Temperature.*—Smart<sup>222</sup><sub>Feb.</sub> concludes a summary of the subject of pyrexia with the following propositions: (1) the animal temperature is not a reliable index of tissue-change; (2) it is by no means a certain indication of the gravity of the disease; (3) pyrexia is, in some degree, to be considered a conservative process not to be checked; (4) the mere control of the temperature by any method, without attention to co-existing conditions, is not productive of good, but often of evil; (5) the use of the synthetic antipyretics should be limited to short periods and selected cases.

*State of the Tendon Reflexes in Febrile Diseases and Under the Influence of Psychic Impressions.*—Longard<sup>1005</sup><sub>B.I.,H.3,4</sub> has observed that, in febrile disorders and in conditions of exhaustion, there may be an exaggeration of the tendon reflexes. Ankle-clonus was found strikingly common in phthisical patients, without exaggeration of other tendon reflexes. In several cases of pneumonia, at the height of the disease, during the delirium, the knee-jerk was absent, while subsequently the tendon reflexes were exaggerated. In a case of paralysis of the palate and of the ciliary muscle following diphtheria, with hyperæsthesia and hyperalgesia, the tendon reflexes were exaggerated, as they were also in cases of hysteria and neurasthenia during the stage of ecstatic excitement, subsiding when a condition of calm was restored. A similar manifestation was observed in the excited insane.

*Influence of Fever upon the Bacillus Coli Communis.*—Bard and Aubert<sup>363</sup><sub>Jan.31</sub>; <sup>112</sup><sub>June</sub> have found the bacillus coli communis in associa-

tion with other bacteria in the fæces of persons free from fever, but in 2 cases of tuberculosis attended with high fever they found the bacillus coli alone. The conclusion is, that the high temperature causes the death of all bacteria but the bacillus coli. This corresponds with the observation that the bacillus coli is found in pure culture in the stools of patients with typhoid fever; so that the presence of the germs is not the cause but the consequence of the fever.

*Hyperpyrexia*.—Kahler <sup>114</sup><sub>V.19, No.1; July</sub> <sup>15</sup> reports a case which seems to indicate the non-dependence of the pyrexia of acute rheumatism upon the joint-lesion. Frodsham and Steedman <sup>6</sup><sub>Oct.31</sub> had a case of acute rheumatism in a man 62 years old, in the course of which the temperature rose to 106° F. (41.1° C.), the patient became unconscious and livid, the breathing became stertorous, and dissolution seemed impending. As a last resort, it was decided to put the patient in a cold bath. Some brandy was administered, and the man was immersed in water of a temperature of 44° F. (6.7° C.). The temperature of the patient gradually declined, but on the following day again rose to 105° F. (40.6° C.). It subsequently became normal, and recovery ultimately took place. Katzenbach <sup>1</sup><sub>June 6</sub> records the case of a man 76 years old, with a rheumatic ancestry and a previous history of rheumatism, in whom, in the course of an attack of acute rheumatism, complicated by pericarditis and pneumonia, the temperature became hyperpyretic, fifteen minutes before death reaching 108.9° F. (42.7° C.).

Carrier <sup>846</sup><sub>Apr.</sub> has reported the case of a woman 24 years old, with a tuberculous family history, who applied for treatment on account of a papular cutaneous eruption. The husband of the woman also presented a cutaneous eruption, while the woman had had a miscarriage followed by puerperal inflammation. Diseased ovaries and tubes were removed by laparotomy. While under observation a number of joints became swollen, painful, and tender, and purpuric spots appeared upon their surface. On two occasions the woman's temperature reached 108° F. (42.2° C.), and on two others 109.6° F. (43.2° C.) and 110° F. (43.3° C.), respectively. Nausea, vomiting, constipation, tympanites, and abdominal pain developed. An exploratory laparotomy was performed, but nothing abnormal was found. The woman ultimately recovered, the subsequent treatment having been symptomatic.

What would be 3 extraordinary cases of hyperpyrexia, if the possibility of deception were with certainty excluded, have been recorded. Galbraith<sup>61</sup><sub>Mar. 21</sub> has reported the case of a young woman in whom he observed the thermometer register a temperature of 151° F. (66.2° C.), while it is stated that, according to an observation made by a nurse, the thermometer on one occasion registered 171° F. (77.3 C.). Jones<sup>74</sup><sub>June, Oct.</sub> has related the case of a girl, 14 years old, in whom the thermometer on one occasion registered a temperature of more than 150° F. (65.6° C.). In the course of the observations numerous thermometers were broken. In neither case was the apparent hyperpyrexia attended with evil results. Duckworth<sup>132</sup><sub>Oct.</sub> has recorded the case of a woman, 26 years old, in whom the thermometer is stated to have registered a temperature of 228° F. (108.9° C.), and in whom a large number of fragments of bone were removed from a two-horned uterus.

*Pyrexia with Temporary Endocardial Bruit.*—Pearse<sup>26</sup><sub>June</sub> reports 1 case each of tonsillitis, influenza, and bronchitis, in children 6, 10, and 12 years of age, respectively, in which, when the temperature in the one case was 101.6° F. (38.6° C.), in the second 102° F. (38.9° C.), and in the third 99.4° F. (37.4° C.), a systolic bruit was temporarily to be heard in the præcordia. The transitory murmur is ascribed to molecular or chemical changes in the blood.

*Water.*—Valentini<sup>69</sup><sub>July 23</sub> recommends copious libations of water in infectious diseases. The good results that attend this adjunct to treatment are manifested by general improvement, by clearing of the sensorium, by increased secretion of urine, by removal of thirst, and by a lowering of the temperature. Lynch<sup>81</sup><sub>May</sub> reports the employment of the hand-spray in the course of typhoid and malarial fevers, and in all conditions of hyperpyrexia in which an immediate reduction of temperature is necessary and the action of the heart is too feeble to warrant the administration of antipyrin, phenacetin, or antifebrin. With an apparatus capable of producing a continuous spray, he has used a solution composed of spiritus ammoniæ aromaticus, 1 fluidrachm (3.75 grammes); sodii chloridi, 1 drachm (3.89 grammes); aquæ, q. s. ut fiat 1 pint ( $\frac{1}{2}$  litre). The spray is directed to one portion of the body at a time, which is dried by an assistant while another portion is being treated. After the patient has been thoroughly dried, he is covered

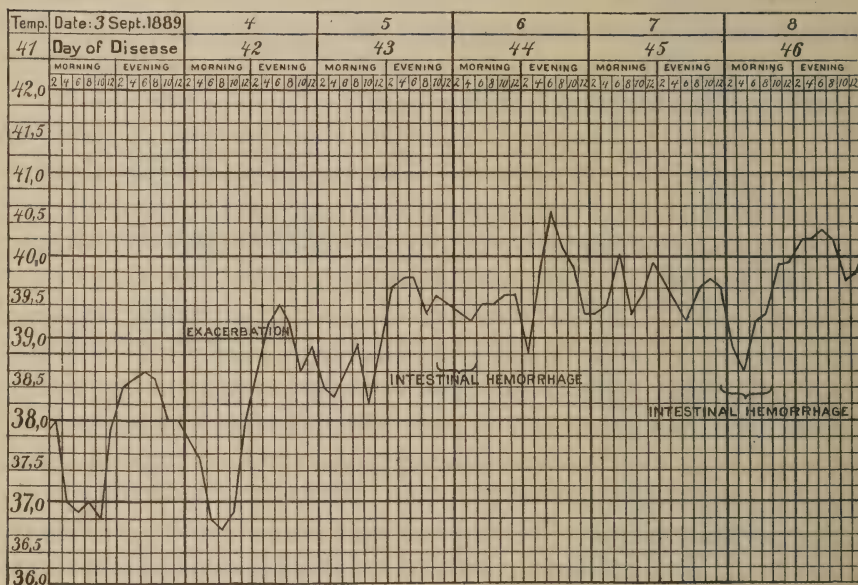
with a blanket, and soon falls into a calm, refreshing sleep, which is followed by perspiration, a lowering of the temperature, and a stronger and less frequent pulse. The relief thus obtained is but temporary, but does manifest good, and is a decided gain.

As the outcome of observations made upon himself, Forest <sup>59</sup><sub>Sept. 19</sub> found that from 12 to 20 ounces (360 to 600 grammes) of warm or hot water can be retained at one time in the colon, all of which will be absorbed into the blood. The mere flushing of the colon with not less than 2 quarts (2 litres) of hot water acts as a powerful stimulant to the kidneys. As a result, the usual quantity of urine secreted by the kidneys may be more than doubled. The result is partially due to the internal application of heat and partially to the absorption of the fluid.

*Diaphoresis.*—Queirolo <sup>57</sup><sub>Nov. 30, '90</sub> reports that intra-venous injections of the sweat of individuals with infectious diseases (typhoid fever, variola, malaria, etc.) gives rise in lower animals to symptoms of intoxication, which appear whether the sweat be sterilized or not. In cases in which hot-air baths had been given as a therapeutic measure, both pulse and fever were favorably influenced; in some cases the paroxysms of malaria ceased; in typhoid fever the symptoms moderated. In the discussion Farina stated that in Africa he had had the opportunity of clinically observing the importance of diaphoresis in infectious diseases. In cases of typhoid fever, measles, and swamp fever that had received no medicinal treatment he had seen decided improvement and recovery merely as a result of profuse perspiration in consequence of the extreme heat.

*Antipyresis Following Transfusion of a Solution of Sodium Chloride.*—Kirstein <sup>114</sup><sub>B.18,H.3,4</sub> reports the exceedingly interesting case of a man, 22 years old, who was admitted to the City Hospital of Cologne on the twenty-first day of an attack of typhoid fever. The tongue was dry; roseola was present; the spleen was enlarged; there was slight meteorism, with gurgling and characteristic stools. The sensorium was dulled, but there were no special complications. The temperature on admission was 39.4° C. (98.4° F.), and pursued a continuous course, not yielding to repeated doses of quinine, or to baths at temperatures varying from 22° to 18° C. (71.5° to 64.7° F.). At the end of nine days the occurrence of morning remissions seemed to mark the beginning of a subsidence by lysis,

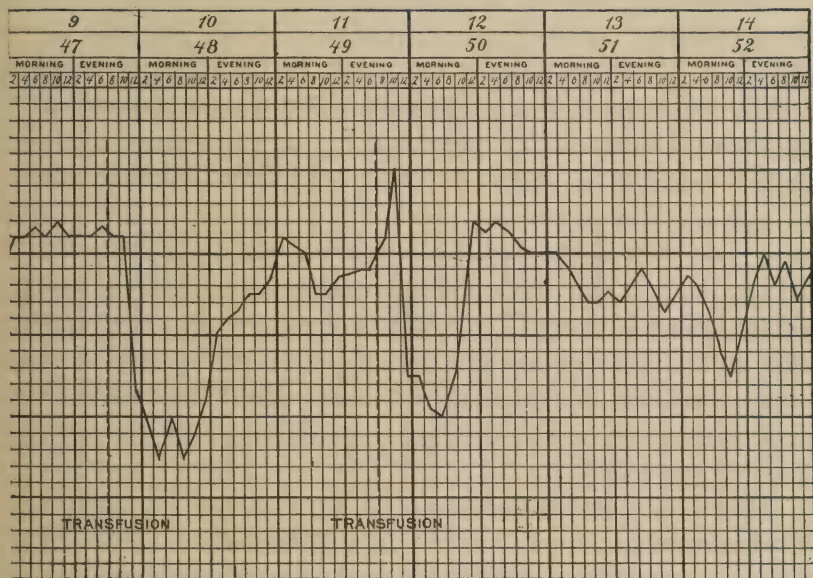
but the decline was not maintained. On the evening of the forty-second day of the disease, without recognizable cause, the temperature rose to  $39.4^{\circ}\text{C}$ . ( $102.8^{\circ}\text{F}$ ). On the following morning it was  $38.2^{\circ}\text{C}$ . ( $100.8^{\circ}\text{F}$ ), in the evening  $39.7^{\circ}\text{C}$ . ( $103.4^{\circ}\text{F}$ ). Subsequently the temperature was again continuous. On the night of the forty-third day decided intestinal hæmorrhage occurred. Despite treatment with opium, plumbic acetate, and tannin a second profuse hæmorrhage occurred on the morning of the forty-sixth day, with manifestations of collapse. The tempera-



TEMPERATURE CHART OF KIRSTEIN'S CASE.  
(*Zeitschrift für klinische Medicin.*)

ture rose above  $40^{\circ}\text{C}$ . ( $104^{\circ}\text{F}$ ). The skin and mucous membranes were blanched, the pulse was extremely frequent and small, the patient complained of noises in the ears and of vertigo, and the heart became so enfeebled that death seemed imminent. As a final resort, the median vein was ligated at the right elbow, an incision made into the vessel to the proximal side of the ligature, and, through a fine-glass cannula fastened into the opening by another ligature, 600 cubic centimetres (20 ounces) of a 0.6-per-cent. solution of sodium chloride, at the temperature of the blood, was slowly transfused. The vein was then ligated to the proximal

side of the opening, the cannula withdrawn, and an antiseptic dressing applied. Immediate improvement was observed, the pulse became moderately full and reduced in frequency from 160 to 132, and the patient fell into a quiet sleep. On the following morning the temperature had fallen to 37.5° C. (99.5° F.), but gradually ascended again in the course of the next day or two. To determine whether or not the transfusion held a causative relation to the decline of temperature a second transfusion of 750 cubic centimetres (24 ounces) of a 0.6-per-cent. solution of sodium



TEMPERATURE CHART OF KIRSTEIN'S CASE.  
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chloride was practiced through a vein of the left forearm. This was followed by an immediate rise of temperature to 41° C. (105.8° F.), with a subsequent decline to 38° C. (100.4° F.), the pulse and general condition suffering no disturbance. Two days later morning remissions set in, and the temperature gradually declined until it reached the normal on the sixty-third day, when convalescence was established.

## ENTERIC FEVER.

*Epidemiology.*—Jaeger <sup>58</sup><sub>June 18</sub> carefully observed an epidemic of typhoid fever in two sections of a regiment of soldiers, in which

there had previously been no typhoid fever. Twelve cases occurred, with 4 deaths. The first 5 cases were palpably due to contagion, while the almost simultaneous occurrence of the last 7 suggested for them a common origin. Suspicion was at once directed to the water-supply. Searching investigation disclosed the possibility of contamination by the excreta of a cavalryman with typhoid fever, and careful bacteriological examination of some of the water used succeeded in detecting the presence of typhoid bacilli in the water.

Magnant<sup>100</sup><sub>Feb.12</sub> reports an epidemic, involving 14 persons living in four different houses, with 2 deaths, the origin of which was ascribed to the dissemination by the air of fæcal matter deposited on the surface, as a result of carelessness in the removal of the contents of a privy-well, into which, a year previously, the undisinfected stools of a patient with typhoid fever had been thrown. Masse<sup>70</sup><sub>Feb.22</sub> describes a case illustrative of the fæcal origin of typhoid fever. A workman, engaged in removing an obstruction and repairing a leak in the outlet of a water-closet in a house in which there had been a case of typhoid fever, was considerably spattered on the body, the lips, and the nostrils by an unexpected discharge of fæcal matter. In less than a week the man developed characteristic symptoms, and subsequently passed through a pronounced attack of typhoid fever.

Houser<sup>192</sup><sub>Nov</sub> reported the case of 2 boys who, within two weeks after immediate exposure to a horribly foul odor from a sewer, developed enteric fever that pursued a typical course, although the boys lived far apart, and there was no epidemic of the disease at the time. Dartigolles<sup>188</sup><sub>Jan.4</sub> observed a small epidemic, in which it was thought that the disease was disseminated by the washing of the linen of several families in water in which the clothing of a patient with typhoid fever had previously been washed. The epidemic subsided when the common washing-place was closed up.

Lardier<sup>33</sup><sub>Apr.</sub> gives several interesting observations of the development of the disease in hamlets and isolated habitations, evidently as a result of the ingestion of water contaminated a long time previously by dejections from patients suffering from typhoid fever.

Destrée<sup>276</sup><sub>May 5</sub> made a number of interesting observations in the course of a limited epidemic of typhoid fever in an inundated sec-

tion of the city of Brussels. The inundation occurred on January 25th. In the months of January, February, and March, 52 cases of typhoid fever were treated at the Hôpital St. Jean. Of these, 42 had used pump-water; 6 had been exposed to the danger of direct infection; in the remaining 4 the source of the disease was unknown. Each of these had drunk only water from the city supply; 1 had used pump-water in washing dishes; another lived in a cellar that had been overflowed. Of the cases that had drunk pump-water, the first symptoms appeared in January in 7, in February in 27, and in March in 6. Of the 27 cases that developed in February, 23 were in persons that lived in the inundated section of the city. The 6 cases in which direct infection from soiled linen and faecal matter was suspected included a domestic, a nun, and two nurses who had rendered the patient assistance; a steward who had washed the linen, and a servant who had been treated for pericarditis, but had left the hospital.

Sedgwick<sup>99</sup><sub>Apr. 23, 30</sub> gives the details of an epidemic of typhoid fever at Lowell, Mass., beginning in September and culminating in November, 1890. From all the testimony that could be gathered, it was demonstrated that the epidemic had its origin in the water-supply from the Merrimack River, infection of which had taken place as a result of contamination of the water of a nutrient stream into which, preceding the epidemic, the stools of patients with typhoid fever had been thrown.

Willoughby<sup>2</sup><sub>Jan. 24</sub> reported a localized outbreak of well-marked enteric fever in a village having a population of 1800. Twenty-four cases occurred, with 3 deaths, all, with one exception, among a dozen families occupying two detached blocks of cottages,—one in the high road and the other in a brick-field at some distance. The water used by these families was obtained from two shallow wells, not more than four feet deep, dug in the surface-sand resting on a stiff clay, which, from the downward approaches, received storm-waters and surface-washings. The water of one well contained 16, and that of the other 6 or 7 grains (0.96, 0.39, 0.45 gramme) of chlorine in the gallon, other evidence of organic pollution being in like proportion, and the former was exposed to further contamination by percolations from cow-yards.

Littlejohn<sup>36</sup><sub>Mar.</sub> describes an epidemic in which 63 cases could be directly traced to the milk supplied from one dairy, the drain-

age and water-supply of which were in such a deplorable condition that contamination of the latter was scarcely avoidable. Inquiry directed to other possible sources of infection failed to determine an adequate cause for the epidemic. Von Mering<sup>57</sup><sub>Oct. 18</sub> reported the outbreak of numerous cases of enteric fever in two prisons remotely separated. Investigation disclosed that those prisoners were affected who, at certain specified times, obtained milk from a common source, upon the suppression of which no further cases appeared. It was also learned that there was no reason to suspect the cows from which the milk was obtained of being infected, but it was probable that either the milk was diluted or the cans were washed with infected water. Lenhartz reported the case of a woman who became infected by drinking milk kept in cans that were rinsed with water obtained from a well that was evidently contaminated by filtration from an adjacent latrine.

Christian,<sup>234</sup><sub>Apr.</sub> in an epidemic involving 11 persons in four families, traced the probable source of infection to the milk obtained from a cow that had drunk at a well, the water of which, on investigation, proved chemically and bacteriologically unfit for drinking purposes. Brown<sup>19</sup><sub>Aug. 8</sub> reported the occurrence of 5 cases of typhoid fever in families living far apart that received milk from a dairyman in whose family there had been 2 cases of the disease. The water-supply was excluded as the channel of infection. It was learned that the servant having the disposition of the milk had assisted in washing the linen of the 2 cases in the dairyman's family without observing suitable disinfectant precautions, and in this way had probably conveyed the infection. Eberth<sup>13</sup><sub>Jan.</sub> reported the case of a pregnant woman who, in the third week of an attack of typhoid fever, expelled a twenty weeks' foetus, still inclosed in its membranes. With rigid anti-septic precautions, some blood from the heart, some pulmonary tissue, and some fluid expressed from the spleen were taken from the foetus. In cover-glass preparations of these, as well as of blood from the intervillous spaces of the placenta, typhoid bacilli were found. Cultures in gelatin and on potatoes developed typically. Comparative observations upon eight other foetuses, of non-typhoid mothers, demonstrated the absence of typhoid bacilli. Amquist<sup>58</sup><sub>Mar. 19</sub> states that, when a case of typhoid fever gives rise to secondary cases, the latter develop at an interval of three or four

weeks, several persons being simultaneously affected. To support his proposition that typhoid fever is contagious, Spiers<sup>53</sup><sub>Jan. 24</sub> has recorded the case of a farm-hand who was seized with typhoid fever while away from home, although he had been at home a number of times during the preceding five months. He was isolated, and nursed by his mother. It was directed that the stools be buried. On the thirty-first day of the boy's illness his mother was stricken with the fever. A little later a younger son, who had come in contact with the first during his illness, developed typhoid fever. On the seventy-first day of the mother's illness a daughter, who had nursed the former, became ill with typhoid fever. The mother died on the eighty-seventh day of the disease. Of two boys who assisted in changing the position of the mother the younger developed typhoid fever. Another son and two daughters—who seldom, if at all, entered the sick-rooms—escaped.

*Bacteriology.*—Vaughan<sup>39</sup><sub>Feb. 16</sub> takes issue with those who maintain that typhoid fever is dependent upon a single specific organism. He admits that a germ responding to the tests supposed to be characteristic of the bacillus of Eberth is invariably found in the bodies of those dead of typhoid fever, and that this germ has been isolated and grown in pure culture; but he maintains that all attempts to induce typhoid fever in the lower animals by inoculation with this germ have been unsuccessful, and that experiments demonstrate that not only does the germ not multiply in the lower animals, but that, when introduced by inoculation, it soon dies. Silvestrini<sup>900</sup><sub>No. 10, p. 226</sub> has demonstrated that if to a bouillon culture of typhoid bacilli, kept for twenty-four hours at a temperature of 32° C. (89.5° F.), an equal part of defibrinated rabbit's blood is added, most of the bacilli are destroyed; those that survive reproduce others. If the mixture is again placed in a thermostat for twenty-four hours, and more blood is added, a large number of bacilli of the new generation is destroyed. It is thus evident that rabbit's blood has a microbicidal action upon typhoid bacilli. It was found that 40 parts of blood were necessary to sterilize 1 part of bouillon culture, but more than 100 parts of blood were required to sterilize the mixture of equal parts of bouillon and blood. In plate cultures of a mixture of 1 part of blood and 10 of bouillon 310 colonies developed, while in plate cultures of a mixture of 1 part of bouillon and 30 of blood but 65 colonies

developed. By this method of successive selection a typhoid virus resistant to the action of the blood of the rabbit was obtained. By inoculating rabbits with cultures of 3 parts of blood and 1 of bouillon symptoms of enteric fever were developed. Four rabbits that died after intervals varying from seven to fifteen days presented intestinal hyperæmia, swelling, and necrosis of Peyer's patches, enlargement of the mesenteric glands, and tumefaction of the spleen. Cultures made from the pulp of the spleen were characteristic of typhoid bacilli.

To determine whether the action of the bacilli of typhoid fever is toxic or infective, Cygnaeus<sup>768</sup><sub>B.7,p.375</sub> inoculated intra-venously, intra-peritoneally, or by the mouth, 16 rabbits, 11 dogs, and 8 mice; 9 of the rabbits, 3 of the dogs, and all of the mice died. Nine mice exposed to air impregnated with typhoid bacillus were unaffected. The results, however, were not conclusive.

In none of 21 cases of typhoid fever in which the stools were examined could Karlinski<sup>50</sup><sub>B.6,No.3</sub> find typhoid bacilli earlier than the ninth day following the chill (which seems to be the initial symptom). In several instances the bacilli were first found in the third week. The number of bacilli increased from day to day, but diminished rapidly as soon as the body-temperature began to decline and the stools became firm.

Kitasato<sup>58</sup><sub>B.7,H.2,'89</sub> has found that typhoid bacilli in culture generate no indol. This peculiarity may be utilized in investigations to determine the presence of typhoid bacilli in milk. Holz<sup>58</sup><sub>B.6,p.143</sub> has found that typhoid bacilli present a characteristic growth when cultivated upon the acid gelatin prepared from the expressed juice of raw potatoes. The growth of molds and of yeast-fungi in this gelatin may be prevented by the addition of 0.05 per cent. of carbolic acid.

*Pathology.*—Fernet<sup>17</sup><sub>July</sub>, <sup>73</sup><sub>Aug.</sub> reports the case of a woman, 79 years old, who presented indefinite symptoms of typhoid fever: headache, delirium, vomiting, and a faecal odor of the breath. On the twentieth day of the disease decided manifestations of meningitis developed: strabismus, exophthalmos, and retention of urine. The temperature became subnormal, coma set in, and death occurred on the twenty-fourth day. At the autopsy, a single Peyer's patch was found involved. The cerebral meninges were injected and contained an excess of fluid; the pia was adherent. In the

inflammatory products the typhoid bacillus was found. Chauffard<sup>3</sup><sub>Sept.30</sub> related a case of adynamic typhoid fever, in a woman 30 years old, in which the action of the heart became accelerated and intermittent, and death resulted from asthenia. At the autopsy, in addition to the ulceration of the ileum, the heart was found softened, and of a pale, yellowish tint, with small areas of deeper yellow. On microscopical examination of fresh sections, the muscular tissue of the heart was found in different stages of degeneration. The myocarditis of typhoid fever is to be ascribed to the action of the toxic products of the activity of the typhoid bacillus.

Schlier<sup>326</sup><sub>B.45,H.3,4</sub> recorded a fatal case in a man 19 years old, in whom, at the autopsy, it was found there had been a submucous purulent cholecystitis, with rupture of the gall-bladder into the peritoneum, and peritonitis. Microscopically examined, the fluid from the wall of the gall-bladder was found to contain bacilli resembling typhoid bacilli. Culture-tests were omitted.

Merkel<sup>34</sup><sub>Feb.10</sub> reported a case of typhoid fever, in a young man, in which, before defervescence had occurred, icterus developed, and death took place, amid symptoms of peritonitis. At the autopsy, in addition to swelling of the spleen and intestinal ulceration, there were found the evidences of a diffuse peritonitis, the starting-point of which appeared to be a healed peritonitis at the under surface of the liver. An abscess of the wall of the gall-bladder had ruptured. There was phlegmonous inflammation of the submucous coat of the wall of the gall-bladder, with sieve-like perforations leading into the cavity of this viscus. In the pus, in addition to staphylococci, bacilli resembling typhoid bacilli were found. Cultures were not made. Gall-stones were not found.

Lefèvre<sup>7</sup><sub>Nov.,90</sub> reported a case, on the twentieth day of which—when the gravity of the symptoms seemed to have moderated and the general condition to have become less alarming than it had been—intestinal hæmorrhage occurred, followed by sudden but transient depression of temperature. Subsequently the patient complained of diffuse abdominal pain, most decided on pressure in the iliac fossæ, but without tympanites; at the same time there was vomiting, in part of a greenish material. A second hæmorrhage occurred on the twenty-fifth day of the disease, and in the fifth week the patient died of exhaustion. At the autopsy the

entire colon, from the cæcum to a little above the anus, contained confluent areas of ulceration. Malvoz<sup>293</sup><sub>Jan.</sub> reported a fatal case, in which, at the autopsy, about a dozen small ulcers were found in the small intestine, a little above the ileo-cæcal valve. The mesenteric glands were swollen and softened; the spleen was considerably enlarged; on the inner surface of the gall-bladder were a number of small ulcers, while the peritoneal surfaces of the gall-bladder and the adjacent colon presented evidence of inflammation. The kidneys contained a large number of small foci of suppuration. In the lesions of the gall-bladder and kidneys only streptococci pyogenes were detected.

Raymond<sup>55</sup><sub>Feb. 28</sub> recorded the case of a woman 31 years old, in whom, on the thirty-seventh day of a relapse of typhoid fever, characterized by grave symptoms, with acute maniacal delirium, a circumscribed area of induration, tender to touch, was detected in the umbilical region. Eight days later death took place in coma. At the autopsy, numerous cicatrices and some ulceration were found in the ileum and cæcum, but no evidences of perforation. The peritoneum was free and intact, and presented no signs of disease, recent or remote. The brain presented no gross lesion. A transverse incision of the abdominal wall opened a large cavity, situated between the aponeurosis of the abdominal muscles and the subcutaneous fat, having no communication with the abdominal cavity, and containing two quarts of reddish, odorless pus. The walls of the abscess-cavity were infiltrated, œdematous, and, on microscopical and bacteriological examination of the contents of this abscess, the bacillus of typhoid fever was exclusively found.

At a meeting of the Clinical Society of London, Phillips<sup>2</sup><sub>Jan. 31</sub> presented the specimens of 2 cases of typhoid fever in which, although death had occurred at a late day in the disease, no ulceration of the bowel was found. The first case was characterized by a copious eruption of rose-spots, a temperature of 104.4° F. (40.2° C.), delirium, tremor, a pulse of 150, looseness of the bowels, and a typhoid state. Death took place on about the thirty-sixth day. At the autopsy, it was found that Peyer's glands, in the lower third of the ileum, were extensively infiltrated; the mesenteric glands were enlarged, but no ulceration existed in any part of the bowel. In the second case rose-spots were present, the temperature rose to 104° F. (40° C.), manifestation of pneumonia

appeared, and a typhoid state developed. There had been marked tremor, but no diarrhœa, although the stools were typhoid in character. At the autopsy, Peyer's patches were found infiltrated; the mesenteric glands were enlarged; the base of the red lung was in the stage of red hepatization, but nowhere was ulceration found.

Bremer<sup>82</sup><sub>Feb.14</sub> presented to the St. Louis Medical Society the specimens from 2 undiagnosed cases of ambulatory typhoid fever in which death occurred suddenly. Both presented pneumonia. In the one ulceration was found not only in the ileum, but in the duodenum and in the colon as well. Typhoid bacilli were found in the intestines, in the lymphatic vessels, in the spleen, in the liver, in the kidneys, and in the lungs. In the second case there was medullary swelling of Peyer's patches. An enormous number of typhoid bacilli were found in the organs examined. Krüpenin,<sup>2072</sup><sub>No.96</sub><sup>26</sup><sub>Nov.</sub> as the results of a study of seventeen parotids and eighteen submaxillary glands from 16 fatal cases of enteric fever, concludes that the suppurative parotiditis of enteric fever is dependent upon the penetration of pathogenic micro-organisms from the oral cavity. Exceptionally, the parotiditis may be metastatic, the pathogenic agent penetrating from adjacent diseased lymphatic glands along lymphatic vessels. In none of the glands were typhoid bacilli found. Carbone<sup>997</sup><sub>No.23</sub> has recorded a fatal case of enteric fever, in a young woman, in which, at the autopsy, in addition to the classical lesions of the disease, an acute endocarditis was found associated with presence of typhoid bacilli, intravenous injections of cultures of which were, in various animals, followed by a reproduction of the same lesion.

In a fatal case, with multiple foci of suppuration, Laveran<sup>3</sup><sub>Mar.4</sub> was able to find in the pus only staphylococci pyogenes aurei, while microscopical examination of sections of degenerated muscle failed to detect the presence of typhoid bacilli.

*Atypical Forms.*—Karlinski<sup>84</sup><sub>Mar.14,21</sub> has reported 3 fatal cases of atypical typhoid fever. In the first the spleen was enlarged, but the remaining essential phenomena of the disease were wanting. Microscopical and bacteriological examination of the blood and of the urine failed to detect the presence of micro-organisms or of plasmodia malarie; examination of the fæces failed to detect typhoid bacilli. At the autopsy, the spleen was enlarged, but no lesions

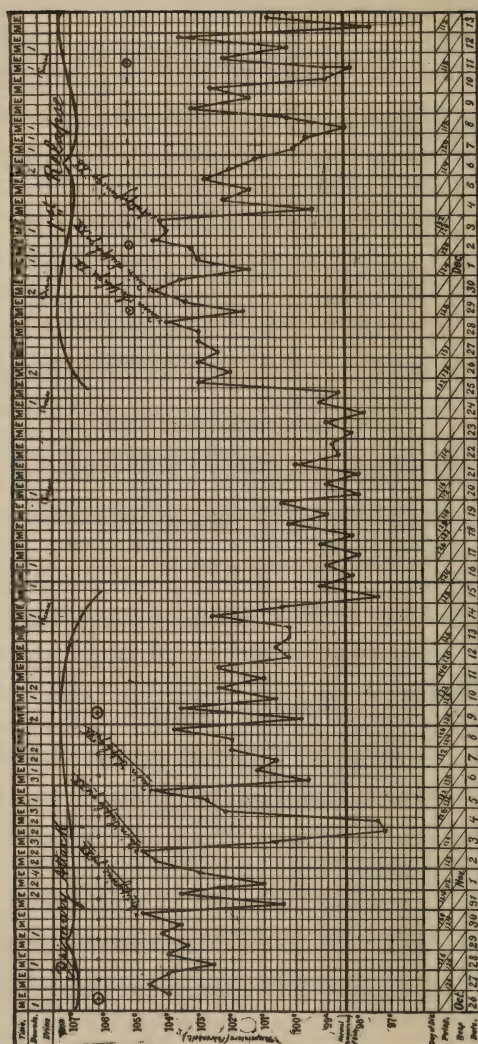
were found in the intestines, nor were the mesenteric glands enlarged. The blood contained in the heart, the heart-muscle, the liver, the kidneys, and the spleen was examined bacteriologically. Only cultures of the splenic pulp developed the typhoid bacillus. In the second case a considerable number of dark-red, lentil-sized spots, slightly raised above the surface, but disappearing on pressure, appeared upon the trunk; the spleen was enlarged. No bacteria were found in the blood or in the urine. At the autopsy the spleen was found considerably enlarged; in the right ventricle, on the septum, beneath the endocardium, were two small, grayish areas of softening; nothing abnormal was found in the abdominal cavity. Plate cultures were prepared from the contents of the areas of softening in the heart, from the splenic pulp, from the blood contained in the heart, and from the liver and kidneys. Those from the blood of the heart remained sterile, while in all of the others typhoid bacilli developed. In the third case typhoid bacilli were found in blood removed from the arm. At the autopsy the ileum, close to the cæcum, contained four small, pigmented, radiating, firm cicatrices; the spleen was greatly enlarged. Cultures were made from the blood of the heart, of the splenic vein, of the portal vein, of the jugular vein, of the splenic pulp, and of the renal artery. All yielded typical growths of the typhoid bacillus. As a result of a considerable experience in the study of the bacteriological aspect of typhoid fever, Karlinski concludes that the lymphatics constitute the channel of dissemination of the typhoid bacilli. Bacilli are often found at points remote from the intestines, they are only exceptionally found in the blood, while they are almost invariably found in the thoracic duct.

Chantemesse <sup>363</sup><sub>June 20</sub> maintains that anatomical changes in Peyer's patches should not be considered an indispensable criterion for the disease. The typhoid bacillus may, as in the fœtus, invade the organism without giving rise to a lesion of Peyer's patches; it may remain in an organ, and retain its vitality and its virulence for a long time after the disease has apparently terminated; it may give rise to septicæmia, as it does in some animals. Observation has shown that the spleen and mesenteric glands may contain pure cultures of typhoid bacilli, while the intestines remain intact. In the variety known as spleno-typhoid there is fever of recurrent type, while symptoms of intestinal disease are wanting; the spleen is

enlarged, but there are slight or no changes in the bowels. Spleno-typhoid differs from recurrent fever in the absence of spirillæ. The affection known in Bosnia and Herzegovina as the "dog disease" is probably typhoid fever modified by malarial fever. Teissier<sup>164</sup><sub>Aug. 6</sub> records the case of a man, 17 years old, who, six days previously to coming under observation, suddenly, during the night, without apparent cause, was seized with headache and profuse epistaxis. On the following day pain in the back was superadded. Subsequently the man felt feverish, languid, and depressed, and had numerous loose stools, together with severe abdominal pain. There was also anorexia and insomnia. The temperature was 37.2° C. (99° F.); the pulse, 84. The abdomen was yielding and slightly protuberant; gurgling could be elicited in the right iliac fossa and in the course of the colon; the spleen was not enlarged. The facies presented a degree of depression out of proportion to the negative signs. The temperature pursued a progressively declining course, the pulse falling to 64. Three days after admission and nine days after the onset rose-spots were found upon the abdomen; on the following day the area of splenic percussion dullness was enlarged. The temperature pursued an inverse course, progressively declining during the first period (corresponding to the usual ascent), then pursuing a continuous (subnormal) course, and finally gradually ascending in the third stage (corresponding to the usual decline). Baginsky<sup>158</sup><sub>B.13, H.4, 5, 6</sub> observed 9 cases of enteric fever in children between 2½ and 11 years. Noma developed in one.

*Complications.*—Hugues and Lévy<sup>243</sup><sub>Aug.</sub> have recorded the case of a man who suffered an ordinary attack of typhoid fever, the temperature becoming normal during the fourth week of the disease. In the fifth week, without obvious cause, a relapse set in. In the sixth week abscesses developed in both forearms and in the left arm. Incision of an abscess of the forearm was followed by extravasations of blood into the intra-muscular and aponeurotic tissues, an acute hæmorrhagic diathesis subsequently manifesting itself by the appearance of petechiæ, ecchymoses, and profuse and obstinate epistaxis. Ultimately, however, convalescence set in, and recovery took place, the patient being dismissed on the ninety-ninth day of treatment. Almost a year later the patient again developed typhoid fever, the attack lasting for fifteen days, and being followed by a relapse, which also lasted for fifteen days. Springle<sup>282</sup><sub>Mar.</sub> has

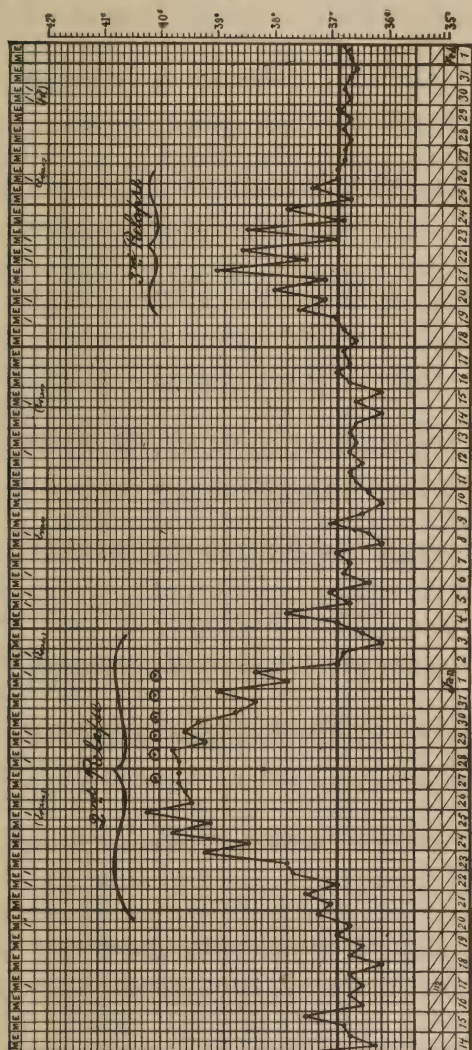
reported the case of a man, 19 years old, who had a mild attack of enteric fever, lasting about two weeks, and characterized by rose-spots, retention of urine, and jaundice. With the disappearance of the symptoms and the subsidence of the temperature solid food



TEMPERATURE CHART IN JOHNSTON'S CASE.  
(*Medical Chronicle.*)

was resumed. On the seventeenth day the patient walked out-of-doors; two days later a relapse set in. During the first week the temperature ranged between  $100^{\circ}$  and  $105^{\circ}$  F. ( $37.8^{\circ}$  and  $40.6^{\circ}$  C.); the pulse was dicrotic and ranged between 100 and 140. The spleen was enlarged, and there was great iliac tenderness. For

forty-eight hours there was incessant vomiting. Toward the close of the first week profuse intestinal hæmorrhage occurred. There was considerable tympanites. In the second week there was vomiting, retention of urine, and slight diarrhœa. Rose-spots appeared



in profusion. The symptoms gradually subsided, and recovery ensued. The duration of the relapse was thirty days.

Johnston<sup>90</sup><sub>May</sub> has recorded 3 cases with multiple relapses. One occurred in a man 39 years old, in whom only a portion of what was considered the primary attack was observed. The patient

had two relapses, and was in the hospital for eighty-one days. The first relapse was separated from the primary attack by an interval of nine days, and lasted three weeks. The second relapse developed nine days after the first had terminated, and lasted nineteen days. The second case was in a woman, 21 years old, who also had two relapses. Rose-spots were present in the primary attack and in the second relapse. The patient was in the hospital for seventy-six days. The first relapse developed seven days after the subsidence of the primary attack, and lasted thirteen days. There was an interval of four days between the two relapses. The second relapse lasted twenty days. The third case occurred in a woman 17 years old, in whom the greater portion of the primary attack and three relapses were observed. (See temperature chart.) The first relapse was separated from the primary attack by an interval of nine days, and occupied twenty-two days. The second relapse was separated from the first by an interval of six days, and lasted seventeen days. The third relapse was separated from the second by an interval of thirteen days, and lasted seven days. The patient was in the hospital one hundred and seven days.

McPhedran <sup>39</sup><sub>Mar.10</sub> had a case of moderately severe enteric fever in a young woman. In the seventh week the temperature, without apparent cause, presented evening elevations. At the end of three weeks a thrombus was found to be extending in the course of the left femoral vein. Previously there had been tenderness, upon deep pressure, in the pelvis. It is thought probable that in not a few cases, protracted without apparent cause, there may be inflammation of veins inaccessible to exploration. A fatal case of pylephlebitis occurred in a man who had passed through a moderately severe attack of typhoid fever. As convalescence was about to set in the temperature became irregular; there were recurrent chills, with sweating; jaundice developed, and the area of hepatic percussion dullness became increased. Subsequently, the manifestations of chronic purulent peritonitis appeared. At the autopsy chronic purulent peritonitis and diffuse pylephlebitis were found. The peritoneum was covered with considerable plastic exudate. In the mesentery, near the ileo-cæcal junction, was found a small abscess, apparently originating from a mesenteric gland, and causing both the pylephlebitis and the peritonitis. Valentine <sup>4</sup><sub>No.17,89</sub> has reported 2 cases, in one of which, during a relapse, an abscess of the left fibula

developed succeeding an injury; in the other an empyema developed. In both cases typhoid bacilli were exclusively found in the pus.

Orlow <sup>69</sup><sub>Nov. 27, '90</sub> had a case in which, eight months after the beginning of an attack of typhoid and six and a half months after its cessation, living typhoid bacilli were found in a granuloma of the tibia, for the relief of which operative interference became necessary. Medvei <sup>57</sup><sub>Aug. 30, Sept. 6</sub> has recorded a case, in a 12-year-old girl, in which the manifestations of grave cerebro-spinal meningitis were, in four days, followed by the appearance of symptoms of typhoid fever. On the twenty-fourth day of the disease a firm, resistant tumor was detected in the left iliac fossa, and on the following day a lumbricoid worm was passed by the bowel. Eventually, the child made a complete recovery. Medvei expresses the belief that the case was one of both cerebro-spinal meningitis and typhoid fever. He was unwilling, however, to ascribe the two diseases to a common cause,—the typhoid bacillus,—preferring to consider them intercurrent.

Jacob <sup>32</sup><sub>Oct.</sub> has recorded a number of interesting features in connection with 50 cases of typhoid fever observed in the Adelaide Hospital during an epidemic in Dublin in the latter half of 1889. The mortality was 14 per cent. One death resulted from perforation; none from hæmorrhage. The majority of fatal cases at first appeared mild. One case developed a psoas-abscess, and died from protracted suppuration. Another, apparently convalescent, developed and died of pulmonary tuberculosis. One case died of heart-failure. In one case a relapse took place after the patient had been dismissed. The primary attack was complicated by erythema nodosum of both legs and arms. The relapse was complicated by œdema of one of the lower extremities, probably as a result of thrombosis of the femoral vein. The temperature was higher and the symptoms were more profound in the relapse than in the primary attack. Three cases presented influenza during convalescence. Not more than three-quarters of the cases presented a typical eruption; in not a few undoubted cases not a single spot was to be found. In several cases there was, at some stage of the disease, in addition to the regular eruption, a diffuse erythematous rash. In a large number there was no diarrhœa. In not a few there was obstinate constipation. Two cases developed in persons

who had nursed patients ill with typhoid fever. One case was complicated by acute nephritis. Two cases, complicated by pneumonia, terminated fatally. In one case an ischio-rectal abscess developed; in another, a parotid abscess; and in a third, a psoas-abscess. The last case proved fatal. In one case a severe and prolonged rigor occurred on the twentieth day, and the temperature rose to  $105.4^{\circ}$  F. ( $40.8^{\circ}$  C.); but, after free perspiration, declined to  $99.2^{\circ}$  F. ( $37.3^{\circ}$  C.). On the following day the rigor was repeated, and the temperature rose to  $106.2^{\circ}$  F. ( $41.2^{\circ}$  C.); a sweating stage followed, and the temperature declined to  $98.8^{\circ}$  F. ( $37.1^{\circ}$  C.). On the next day the train of symptoms was repeated, the temperature, however, reaching  $107^{\circ}$  F. ( $41.7^{\circ}$  C.), but within twelve hours falling to  $97^{\circ}$  F. ( $36.1^{\circ}$  C.). These paroxysms continued daily for three weeks, and gradually subsided under the influence of quinine. On the forty-second day of the disease a dysenteric attack set in and continued for two weeks, the patient being able to sit up on the fifty-seventh day.

A child of 6, in a family of which two other members had enteric fever, presented symptoms of typhoid fever, although the eruption was wanting. At the end of the fourth week convalescence appeared to be established. The lungs had previously been carefully examined, but no signs of disease were detected. The child now had an attack of chicken-pox. The case did well for a fortnight, when, one evening, the temperature rose to  $103.8^{\circ}$  F. ( $39.9^{\circ}$  C.); on the following evening it was  $105^{\circ}$  F. ( $40.6^{\circ}$  C.), and the child again became extremely ill. The spleen was enlarged, and evidences of infiltration of the apices of the lungs became manifest. Subsequently the abdomen became distended, and presented signs of ascites. Death took place in the sixteenth week of the illness. At the autopsy there were evidences of peritonitis. In the lower portion of the ileum Peyer's patches were prominent and deeply stained, as if as a result of past inflammation. Only in the neighborhood of the cæcum and in the cæcum itself were ulcers found; these were tuberculous. The mesenteric glands were enlarged and cheesy. There was a large cavity in the upper lobe of the right lung. There were extensive deposits of tubercle in both lungs, the process being the more advanced in the right lung. In 1 case, in a child, cancrum oris developed in the third or fourth week, and death resulted. In 1 case right

hemiplegia and aphasia, with some loss of sensation, developed in the third week of the attack. Two cases presented phlebitis of the femoral vein. In the case of a boy, a condition of imbecility appeared during convalescence.

Jaccoud<sup>212</sup><sub>Sept.10</sub> related an interesting case of typhoid fever with numerous complications, and death from perforation. The case was, from the outset, recognized as a grave one, because of the unvarying temperature. It may be accepted as a rule that, when the remissions of temperature in typhoid fever are persistently smaller than the physiological diurnal variations, the case is a grave one. The case in question also presented atony of the bowel. There were no spontaneous evacuations, but when enemata were administered the stools were diarrhoeal. In the course of the attack severe pain in the left hypochondrium suddenly developed. An infarction of the spleen, which was enlarged, was diagnosed, and the diagnosis was confirmed at the autopsy. Finally, several days after defervescence had begun, there was a sudden elevation of temperature, with a violent chill and intense abdominal pain and meteorism. Death occurred thirty-four hours after the first chill.

Destrée<sup>276</sup><sub>Aug.6</sub> believes that, while the typhoid bacillus is occasionally the sole factor in the causation of suppuration in the course of enteric fever, in the large majority of cases suppuration complicating typhoid fever is dependent upon secondary infection by ordinary pyogenic micro-organisms. In 4680 cases tabulated by Fitz<sup>99</sup><sub>Oct.1,8</sub> there was a mortality of 6.58 per cent. from perforation of the bowel. The complication is much more common in males than in females,—as 71 to 29. It is rare in children, while it is most common between 10 and 40. Perforation may take place between the end of the first week and the sixteenth week, though it is most common between the second and sixth. In 167 cases the perforation was situated in the ileum in 136 (81.4 per cent.), in the large intestine in 20 (12.9 per cent.), in the vermiform appendix in 4, and in the jejunum in 2. In each of 19 cases there were two perforations, in each of 3 there were five, in 1 there were four, and in each of 4 there were several. In 1 case there were from twenty-five to thirty holes, and in another there were thirty. Of 134 cases, 37.3 per cent. died on the day of perforation; 29.5 per cent. on the day following operation; 83.4 per cent. died

within a week of perforation. Nine cases lived into the second week, 4 into the third, while 1 lived for thirty days, and another for thirty-eight days after the accident. The occurrence of perforation bore no definite relation to the severity of the disease. In about one-quarter of 200 cases it was stated that the attack was mild. Fourteen were cases of ambulatory typhoid. In some cases perforation was unattended with symptoms; in others the symptoms were latent; in some gradual; in some sudden. Of 167 cases of perforation of the bowel, in typhoid fever, in but 5 is it stated that the appendix was perforated.

Major <sup>2</sup><sub>May 30</sub> had a case in a man 21 years old, in whom sudden symptoms of collapse indicated the perforation of an intestinal ulcer. Three weeks after the onset of the acute manifestations a gush of dark-looking fluid took place from the anus, followed in half an hour by a second gush. In three days all trace of swelling had disappeared. Convalescence soon followed, and went on to complete recovery. Schuster <sup>158</sup><sub>Nov. 5, 6</sub> has reported 2 cases of laryngo-typhoid in which laryngeal manifestations preceded the onset of enteric fever. Gellé <sup>37</sup><sub>July</sub> considers the general and local conditions that favored the perforation of the nasal septum, occurring in the course of typhoid fever in an adolescent of 16 years. An important factor is the profound depression of the nutritive and nervous forces. With the general emaciation, there occurs a remarkable thinning of the cartilaginous portion of the nasal septum, to induce ulceration and perforation of which but slight traumatism—such as may be inflicted by the picking of the nose—is requisite. Once established, the perforation displays little tendency to close. It may prove the point of departure for secondary infection.

Kieseritzky <sup>21</sup><sub>Apr. 18</sub> has reported the case of a woman, 23 years old, who, on the seventh day of an otherwise normal puerperium, presented a febrile temperature of progressively ascending type. In the absence of any detectable lesion in the genital tract, and in the presence of an enlarged spleen, a diagnosis of typhoid fever was made. On the ninth day a diffuse roseola appeared all over the body. As, on the eleventh day, the roseola commenced to fade, a diffuse erythema, somewhat resembling the eruption of measles, appeared. On the twenty-fourth day of the attack the stools contained small quantities of blood and bed-sores developed. The

stools also contained blood on the twenty-eighth and on the thirty-fourth days. The heart was now enfeebled, the pulse dicrotic. On the thirty-second day the left leg was observed to be œdematous, and a hard cord was felt in the upper third of the course of the femoral vein. Convalescence finally set in, but was protracted.

Talamon <sup>31</sup><sub>May 28</sub> states that cases of enteric fever, in which the onset is marked by an acute pleurisy of special characteristics, are to be distinguished from cases of simple pleurisy by the intensity and continuous course of the fever, by the general depression, by the headache and vertigo, and by the sleeplessness. Pleuro-typhoid is to be distinguished from acute purulent pleurisy. In the latter the physical signs are in accord with the constitutional symptoms; the intensity of the dyspnœa and the suddenness with which the effusion occupies the entire pleural cavity will necessitate thoracocentesis, when the character of the effusion will be revealed. In pleuro-typhoid, on the contrary, the symptoms are out of all proportion to the physical signs; with the evidences of an ordinary pleurisy and moderate effusion are associated high fever and adynamia. There is some resemblance between tuberculous pleurisy and pleuro-typhoid; but the temperature of the latter is continuous until the remission of the second week, while the temperature of the former is oscillatory and remittent, with distinct morning remissions and evening exacerbations. Should any doubt continue, it would be dissipated by the eighth or ninth day by the presence or absence of rose-spots, of diarrhœa, and of other characteristic symptoms.

Hanquet <sup>454</sup><sub>June</sub> records the case of a man 32 years old, in whom an attack of typhoid fever was gravely complicated by the formation of many bed-sores, and to which subsequently dry gangrene of a large number of phalanges of both feet was superadded. He also describes the case of a man, 25 years old, who, at the conclusion of an attack of typhoid fever, remained debilitated and emaciated, instead of entering upon convalescence. It was not long before the evidences of a pleural effusion appeared; and these subsequently indicated the existence of pyothorax. Constitutional treatment failing to dissipate the collection of fluid, pleurotomy eventually became necessary; in the pus streptococci were found. Wedensky <sup>113</sup><sub>Feb. 22</sub> reports the case of a lad 17 years old, in whom symmetrical gangrene developed two years after an attack of

typhoid fever. The peripheral nerves were found degenerated, but no changes were found in the peripheral vessels or in the cerebral nervous system. It is believed that the morbid changes were induced by a toxic action of the products of the activity of the typhoid bacillus. Péan and Cornil <sup>10</sup><sub>Apr. 14</sub> have recorded the case of a girl of 19, in whom, in the course of a protracted convalescence from typhoid fever, pain and swelling developed in the left tibia. An incision gave exit to a little pus, but did not relieve the pain or reduce the swelling. Five months later two prominences were found on the left leg: the one, a little below the tubercle of the tibia; the other, at the junction of the middle and inferior thirds of the bone. The latter was the larger; it had developed rapidly, and was exceedingly painful. A third mass was seated on the right tibia. An operation revealed the swellings to be occupied by cavities possessing hard, smooth walls, and containing vascular tissue. The skin was thinned, but the periosteum was thickened. A suppurating periostitis was found in connection with the lower tumor of the left leg. The condition of the patient was relieved, although a fourth swelling appeared at the outer margin of the left forearm. Cultures prepared from the contents and the walls of the cavities developed typhoid bacilli.

Potain reports the case of a man 25 years old, in whom typhoid fever developed two weeks after convalescence from an attack of scarlatina. The case was pursuing an apparently mild course, when, early in the third week, fatal perforation of the bowel took place. Hare and Patek <sup>9</sup><sub>June 20</sub> have reported several cases of typhoid fever presenting unusual complications. In the case of a woman 24 years old acute maniacal delirium developed during the first week of the disease, before the appearance of rose-spots. Subsequently, in addition to the eruption, the tongue became heavily and typically coated, the temperature pursued a characteristic course, and the peculiar odor observed in typhoid fever became manifest. The patient grew worse, and died during the third week of the disease, without a restoration of psychic equilibrium. The second case occurred in a man, 34 years old, who had been nursing his wife, ill with typhoid fever. Seventeen years previously he had had an attack of typhoid fever, with intense delirious excitement. The patient complained of headache and insomnia. Subsequently acute maniacal delirium developed, hy-

perpyrexia appeared, and death supervened. In a girl 22 years old, with a history of chronic suppurative otitis media, facial erysipelas developed at the height of a secondary attack of typhoid fever. The case terminated favorably. In another girl 20 years old facial erysipelas, preceded by chill and elevation of temperature, developed in the third week of an attack of enteric fever. The intercurrent affection in no way seemed to increase the gravity of the case. During the third week of a mild attack of enteric fever, in a girl 19 years old, the temperature suddenly rose to 104° F. (40° C.); to decline, after a cold bath, to 98° F. (36.7° C.), with a loss of the pulse at both wrists. Intestinal hæmorrhage was suspected, but in the course of twelve hours facial erysipelas developed, and the further progress of the case was uninterrupted.

In an epidemic of typhoid fever observed by Finlayson<sup>5</sup> in an infirmary, several of the inmates had slight attacks of fever, lasting a few days and terminating in recovery. One patient had an attack lasting two days. Fifteen days later she had a relapse that proved fatal in four weeks. In the case of a man living in a house in which there was typhoid fever, and who was ill and "out of sorts" for two weeks, his temperature not rising above 100° F. (37.8° C.), a carbuncle developed and death took place from septicæmia. In another case, in which the urine contained albumen and tube-casts, convulsions (probably uræmic) set in, and were followed by death on the seventeenth day. In a fourth case, in which a gangrenous spot appeared on the sole of the foot, at the end of a month cystitis developed and death took place in the sixth week. In a case in which a relapse occurred, low, muttering delirium, attended with hallucinations, set in with the subsidence of the pyrexia; there was a peculiar tremor of the head, as well as complete sleeplessness. In another case in which a relapse took place, the temperature rose suddenly, two weeks after the defervescence, with the development of pain in both tibiæ, dependent upon necrosis, as the further progress of the case demonstrated. In one case solidification of the base of one lung in the fourth week of the disease was followed by gangrene and death in the eighth week. In 1 case numbness and stiffness of the legs and weakness of the arms, with muscular wasting, developed three weeks after the termination of an attack of typhoid fever. The administration of tonics and the employment of electricity were followed by recovery. In

1 case the symptoms of enteric fever were preceded by those of meningitis. Subsequently the symptoms of meningitis again manifested themselves. Progressive emaciation set in, and death took place a month after the onset of the illness. The autopsy disclosed the existence of tuberculous meningitis and of partially cicatrized ulceration of the small intestine, not tuberculous.

Wilson<sup>19</sup><sub>June 18</sub> has reported a case of caries of a costal cartilage following enteric fever.

Cerné<sup>203</sup><sub>Apr. 1</sub> details a case of typhoid fever, in a child 11 years old, in which the most distressing symptom was intense pain in the right flank. The pain was relieved by the application of a blister. A diagnosis was made of ulceration of the hepatic flexure of the colon, or of a loop of intestine caught between the diaphragm and the liver, with adjacent pneumonia and perforation of the intestine into the pleura and lung. The great emaciation, the intense pain, the oppression, the incessant dry cough, and the frequent pulse rendered the prognosis dubious. Remissions in the patient's condition, however, took place. These were associated with increased expectoration, while with suppression of the expectoration the condition was aggravated. The symptoms and the signs gradually receded, and in the course of three months the patient was restored to health.

McKechnie<sup>282</sup><sub>Jan.</sub> has reported 2 cases of otherwise mild typhoid fever, in which manifestations of deranged cardiac function were prominent. Phillips<sup>6</sup><sub>May 30</sub> observed a mild case in an adult male, in whom the action of the heart was feeble and irregular. During convalescence considerable elevation of temperature suddenly occurred on a number of occasions. In one exacerbation the temperature reached 106.1° F. (41.1° C.). Dysart<sup>233</sup><sub>Dec., '90</sub> has recorded a case, in a man of 35, in which—four or five days after a syncopal attack in the third week of the disease, ascribed to the formation of a heart-clot—inflammation and thrombosis of the left femoral vein occurred.

Gosse<sup>6</sup><sub>Dec. 13, '90</sub> describes the case of a man 18 years old, in whom, in the third week of a tardy convalescence from an attack of enteric fever lasting five weeks, the dorsum of the left foot became purple, then mottled and gangrenous. Under treatment the slough came away in the course of a week, exposing the tendons and muscles. The denuded surface was almost completely cov-

ered with granulations when the patient was discharged, in the ninth week of convalescence. Spirig<sup>214</sup><sub>Feb.1</sub> had a case of a woman 22 years old, in whom, in the fifth week of an attack of typhoid fever, after the intensity of the disease had subsided, suppuration manifested itself in the right lobe of a goitrous thyroid gland. An incision gave exit to considerable pus, in which, on microscopical and bacteriological examination, both typhoid bacilli and staphylococci pyogenes albi were found.

Peter,<sup>3</sup><sub>July 15</sub> at a clinical demonstration, presented a man, 26 years old, with decided neurotic tendencies, who, during convalescence, displayed a polymorphous erythema. In the course of a mild attack the man had had profuse sweats, intense dyspnœa, and for a short time was speechless. During convalescence the skin in places presented large areas of redness, with fine punctation; at other places there were large, coarse papules; elsewhere, and especially on the face, there were numerous pustules. Scarlatina, measles, and variola were excluded; nor was the eruption to be ascribed to the administration of copaiba, belladonna, or bromides. At the Second Congress of Mental Medicine, at Lyons, Joffroy<sup>3</sup><sub>Aug. 12</sub> reported several cases, attended with profound delirium, in which inquiry disclosed the existence of mental disease in the antecedents. The conclusion is, that when insanity develops in the course of or as a sequel to typhoid fever the latter is but the exciting cause.

*Statistics.*—MacDonnell<sup>282</sup><sub>June</sub> has reported an additional series of 32 cases of enteric fever treated at the Montreal General Hospital (see ANNUAL, 1891). Most of the patients were admitted during the winter service. There were no deaths, although there were many severe cases. MacDonnell reiterates his view that tuberculosis is rarely a sequel to typhoid fever. He believes that, preceding the local manifestations of pulmonary tuberculosis, there occurs a tuberculous fever, which is liable to be mistaken for typhoid fever. Cutaneous eruptions were present in 19 cases. In 1 case, that proved severe, the rash gradually extended from the abdomen all over the body to the arms and thighs, and over the neck and face to the lower lid of the right eye. A scarlatiniform rash was observed in 4 cases; these proved severe and protracted. The rash was diffuse, but was not as intensely red as the exanthem of scarlatina; nor was it punctate. It was particularly well marked

about the neck and chest, but was not accompanied by sore throat. In 1 of these cases an attack of urticaria developed in the fourth week subsequently to the administration of a dose of potassium bromide. In another case, in which, however, no bromide was given, urticaria also developed. In a young woman herpes zoster appeared during convalescence, and occasioned much distress. In but 1 case was there diarrhœa; in none was excessive meteorism present. In 12 cases the spleen was found to be decidedly enlarged. One case remained in the hospital for a hundred days. The temperature became normal on the thirty-fifth day; it remained so for a week, and then slowly rose to 102° F. (38.9° C.); it continued high for three weeks more, slowly again reaching the normal. The case presented many unfavorable symptoms. After leaving the hospital periostitis, perichondritis of the costal cartilage of a rib, and periostitis of the adjacent sternum took place. Another case remained in the hospital for ninety-four days. The temperature became normal on the thirty-first day. After an apyrexial period of six days the temperature again slowly rose, and remained high for two weeks; finally, however, reaching the normal on the eighty-first day. In the relapse troublesome retching developed, and a round-worm was vomited. One case occurred in a pregnant woman: when the temperature became normal she returned to her home, and was delivered; three weeks later she returned with a relapse and a fresh crop of spots. Two of her children also had typhoid fever. Subsequently the woman developed periostitis of the right tibia, and ultimately chronic pulmonary tuberculosis. One case occurred in a woman in whom, a year previously, the vermiform appendix had been removed. In this case and in another incessant cough was an annoying and alarming symptom.

As a result of observations upon 384 cases, Zieniec <sup>520</sup><sub>No. 41, '90</sub> found that throughout the febrile period the daily loss of weight was 0.6 per cent. The loss did not cease with the disappearance of fever. Both loss and subsequent increase of weight were greatest at first, and grew progressively less. Diarrhœa, diaphoresis, and intestinal hæmorrhage increased the loss of weight and retarded increase. When threatening symptoms, such as delirium, were present, the daily loss of weight became 1 or 1½ per cent.; this increased loss was also observed in case of complications, such as pleuritis, pneu-

monia, parotiditis, otitis, and became apparent even before their development. A sudden cessation of increase in weight is indicative of the occurrence of a relapse. During convalescence the muscular strength increases  $\frac{1}{2}$  kilo ( $1\frac{1}{4}$  pounds) daily. When the daily loss of weight exceeds 1 per cent. the prognosis is grave. In fatal cases the total loss of weight was 22 per cent. of the body-weight.

Hölscher <sup>34</sup><sub>Jan. 20, 27</sub> has reported 2000 fatal cases of typhoid fever in which autopsies were held. Twenty-four per cent. died from the immediate effects of the typhoid poison. In 24 cases death was reported as sudden,—in the majority from degeneration of the heart-muscle. Tracheotomy was performed in 15 cases, usually for perichondritis of the larynx. Pregnancy proved a serious complication. Of the 800 women in the series, 27 were pregnant. There were 5 cases of ambulatory typhoid; 2 of these died from indiscretions in diet, 2 of degeneration of the heart, and 1 of decided anæmia. Relapse took place in 103 cases. The proportion of males to females was as 3 to 2. The average age was  $27\frac{1}{2}$  years. Of the males, 1 was over 75 years old and 1 was a nursing infant. Of the females, 1 was 72 years old, 1 was 9 months old. In 50 per cent. of the cases death took place in the third and fourth weeks; in 25 per cent., in the second and fifth weeks; in  $2\frac{1}{2}$  per cent., in the first week. Over 50 per cent. of those who died in the first week were free from complications. The causes of death that prevailed in 5 per cent. of cases or more were the following: œdema of the lungs, 15 per cent.; parenchymatous and fatty degeneration of the heart, 13 per cent.; parenchymatous and fatty degeneration of the liver, 10 per cent.; bronchitis, 10 per cent.; lobular pneumonia, 8 per cent.; croupous pneumonia, 7 per cent.; hæmorrhagic infarction of the lung, 6 per cent.; perforation of the intestines, with peritonitis, 6 per cent.; intestinal hæmorrhage, œdema of the brain, and bed-sores, each 5 per cent.

*Sequelæ.*—Bourdillon <sup>3</sup><sub>Sept. 20</sub> reported a case in which atrophic cirrhosis of the liver was observed in the sequence of an attack of typhoid fever. Liszt <sup>57</sup><sub>Sept. 20</sub> observed a case in which suppurative inflammation of the middle ear developed in the fourth week of an attack, and subsequently to which florid pulmonary tuberculosis developed, with a speedy fatal termination. At the autopsy

typhoid cicatrices and tuberculous ulceration were found in the intestines side by side.

*Diagnosis.*—As a result of observations made in 87 cases of typhoid fever, Rüttimeyer<sup>214</sup><sub>No.10,90</sub> concedes to the diazo-reaction a high diagnostic significance. Together with tumor of the spleen and roseola, he considers the reaction one of the most constant and earliest manifestations of the disease. Landouzy<sup>3</sup><sub>June 3</sub> has described a type of asthenic fever, dependent upon the invasion of the tubercle bacillus prior to the formation of tubercles, to which he gives the name of pretuberculous bacillary fever, or typho-bacillose. The greatest circumspection is required to distinguish it from typhoid fever. In 10 of 14 cases of suspected enteric fever Redtenbacher<sup>114</sup><sub>B.19,p.305</sub> was enabled, by puncture of the spleen and bacteriological examination, to confirm the diagnosis. In 1 of the remaining 4 cases the puncture was not deep enough to penetrate the spleen; in another case the disease was probably subsiding; a third subsequently developed purulent meningitis,—so that in only 1 did the method really fail. In all of the cases bacilli had been looked for in the stools and in the blood of the rose-spots, but were not found. The procedure, even if repeated, proved harmless.

*Treatment.*—For purposes of disinfection, Dujardin-Beaumont<sup>80</sup><sub>Jan.15</sub> recommends a cupric sulphate. A solution of 50 grammes (about  $1\frac{2}{3}$  ounces) to a litre (a quart) of water should be kept in the vessel intended to receive the dejecta; such a solution will also serve to disinfect soiled linen and to purify water-closets. A solution of 12 grammes (3 drachms) to the litre (1 quart) will serve for washing the hands and face of those in attendance upon the patient, as well as the parts of the cutaneous surface of the patient that have been soiled by the dejecta. In the treatment of the disease, Dujardin-Beaumont prefers salol to all other agents. From 2 to 4 grammes ( $\frac{1}{2}$  to 1 drachm) of the remedy alone or in combination with bismuth salicylate may be given in the course of twenty-four hours. While admitting the utility of baths, not only cold, but also tepid, Dujardin-Beaumont expresses his deprecation of systematization in the treatment of enteric fever. Yeo<sup>6</sup><sub>Apr.11,18</sub> commends the employment of chlorine-water in combination with quinine. Forty minims (2.5 grammes) of strong hydrochloric acid are introduced into a 12-ounce (360 grammes) bottle containing 30 grains (1.97 grammes) of potassium chlorate. Chlorine-gas

is at once liberated. The bottle is tightly corked, until it has become filled with the greenish-yellow gas. The water is poured into the bottle little by little, shaking well after each addition, until the bottle is filled. To 12 ounces (360 grammes) of the solution are added 24 or 36 grains (1.55 to 2.33 grammes) of quinine and 1 ounce (37 grammes) of syrup of orange-peel. Of this mixture 1 ounce (31 grammes) is given every two, three, or four hours. A number of illustrative cases are reported. Wolff<sup>9</sup><sub>May 23</sub> gives the results of observations upon 100 cases treated with naphthalin. On admission to the hospital 2 doses each of a grain (0.065 gramme) of calomel with soda were administered, at an interval of three hours, unless diarrhœa forbade. Immediately afterward 5 grains (0.32 gramme) of purified and finely-powdered naphthalin, in capsules, were administered every four hours, alternately with a small dose of dilute hydrochloric acid. Chemical antipyretics and cold-sponging were employed only when indicated by hyperpyrexia. The diet consisted of milk, alternating with meat-broths containing raw eggs. Stimulants were administered as required. Of the 100 patients thus treated the mortality was 10 per cent.

Waugh<sup>760</sup><sub>June 13</sub> has employed zinc sulpho-carbolate in more than 100 cases of typhoid fever without a death. He administered  $2\frac{1}{2}$  grains (0.16 gramme) every two hours, until the stools were no longer offensive in odôr, and then with sufficient frequency to maintain the stools free from odor.

Smakowsky,<sup>551</sup><sub>No. 1</sub> from observations upon 700 cases of enteric fever, concludes that the administration of fractional doses of calomel constitutes the simplest and the most efficacious mode of treatment. Three-fourths of a grain (0.049 gramme) are given every hour, for 10 doses if necessary, or until copious, soft, greenish stools have been induced, a gargle of potassium chlorate being simultaneously employed to prevent the development of stomatitis. When the action of the heart is feeble, treatment with calomel is preceded by the administration of infusion of digitalis. A second course of calomel may be given after an interval of a day. During this time and subsequently  $2\frac{1}{2}$  grains (0.16 gramme) of bismuth subnitrate,  $1\frac{1}{2}$  grains (0.097 gramme) of quinine sulphate, and  $\frac{1}{3}$  grain (0.052 gramme) of naphthalin are administered in powder.

Hayem<sup>212</sup><sub>Oct. 10</sub> recommends the employment of lactic acid. Given

in large doses, it is said not only to control the diarrhœa, but also, under certain conditions, to abridge the duration of the disease. In most cases the remedy is well borne. In mild cases 15 grammes (4 drachms) in a litre (1 quart) of lemonade, sufficiently sweetened, may be administered in twenty-four hours. The addition of carbonated water will overcome excessive acidity of taste. Should constipation result, enemata may be necessary. As the fever declines the dose may be reduced to 12 and then to 10 grammes (3 and  $2\frac{1}{2}$  drachms) daily; during convalescence 5 grammes ( $1\frac{1}{4}$  drachms) may be administered in twenty-four hours. Should the temperature reach  $40^{\circ}$  C. ( $104^{\circ}$  F.) or higher, the daily dose should be made 20 grammes ( $5\frac{1}{4}$  drachms). If diarrhœa be excessive, or meteorism be decided, 25 or 30 grammes ( $6\frac{3}{4}$  to 8 drachms) may be given daily. When large doses are indicated, it is preferable to administer 15 or 20 grammes (4 to  $5\frac{1}{4}$  drachms) of lactic acid conjointly with 2 grammes (32 grains) of hydrochloric acid. In the doses indicated lactic acid is innocuous. In the severest cases the employment of cold baths should be added to the medicinal treatment.

Keegan<sup>26</sup><sub>Mar.</sub> has successfully employed boric acid, in doses of from 10 to 20 grains (0.65 to 1.30 grammes) every four hours, in a considerable number of cases. Hill<sup>19</sup><sub>Jan. 17</sub> maintains that ergot overcomes the headache, sustains the circulation, controls the diarrhœa, prevents intestinal hæmorrhage, exerts a favorable influence on the inflammatory process, relieves tympanites, and diminishes the likelihood of perforation. In some 30 cases of typhoid fever in which ergot was employed the results were most satisfactory. From 20 to 30 minims (1.25 to 1.87 grammes) of the fluid extract were administered every four, six, or eight hours, according to the indications of the case.

Prochaska<sup>569</sup><sub>No. 3, '90</sub> has employed sodium iodide in 361 cases, with 17 deaths. The remedy was given, in doses of 5 grains in milk, every two or two and one-half hours. Commonly, an equal quantity of sodium benzoate was conjointly administered. In 40 per cent. of the cases the duration of the disease was abridged. The higher the temperature and the more profound the symptoms, the larger should be the dosage. The treatment should be continued until the tenth afebrile day. Neither age, nor sex, nor incipient tuberculosis, nor intestinal hæmorrhage is a contra-indication.

Wilson<sup>9</sup><sub>Dec.6,'90</sub> has reported a series of 40 cases treated by cold baths without a death. Cases seen before the tenth day of the disease received one or two laxative doses of calomel. The bath was given every three hours; as long as the temperature—taken in the mouth or axilla—was 101.5° F. (38.6° C.). One case of the series suffered a relapse, another two relapses. Intestinal hæmorrhage occurred in 2 cases. Upon the supervention of hæmorrhage bathing was discontinued. The average number of baths in each case was 42; the smallest number was 10; the largest, 138. Complications were insignificant. There were no sequelæ.

Lyonnet and Chatin<sup>211</sup><sub>Dec.7,'90</sub> have reported a series of 53 cases of typhoid fever, of which 49 were treated by means of baths, in accordance with the method of Brand; the 4 not so treated were mild. There was but 1 death; that occurred in an obese woman, 48 years old, who entered the hospital on the eighteenth day of the disease in a condition of extreme adynamia, presenting marked dyspnœa, delirium, and intestinal hæmorrhage. She died, in collapse, eight days after admission.

Bouveret<sup>211</sup><sub>Apr.16,May 3</sub> reported 100 cases of enteric fever treated by means of cold baths with but 3 deaths; 38 of the cases were in males, 62 in females. Lacour<sup>22</sup><sub>Apr.20</sub> in the case of a girl 11 years old, gave 327 cold baths. Sihler<sup>222</sup><sub>Mar.</sub> is also an ardent advocate of cold baths.

Chauffard<sup>3</sup><sub>Sept.30</sub> maintains that, while the internal administration of antiseptic agents neutralizes the development of the toxic products of the activity of the typhoid bacillus, upon which the myocarditis of enteric fever depends, the systematic employment of cold baths in treatment exerts a prophylactic influence by favoring the elimination of the toxic matters. When the myocarditis has developed the baths are not to be suspended; they should be cautiously continued, and the heart supported by caffeine,—administered by the mouth and subcutaneously.

To remove the possibility of chill and shock, and to overcome the repugnance and mental distress of the patient, in connection with the cold bath, Hodson<sup>267</sup><sub>Mar.1</sub> proposes the graduated bath as a substitute. When the patient once comfortably rests in the bath, a current of cold water can be slowly introduced, so as to gradually reduce the temperature.

Seibert<sup>59</sup><sub>Sept.12</sub> ascribes the utility of flushing the colon at regular

intervals to the cleansing effect, as a result of which the bowel is relieved of the accumulation of bacteria and toxic products.

Roque and Weill<sup>92</sup><sub>Sept.</sub> found that, in cases treated without medication, the urotoxic co-efficient of the urine was double the normal co-efficient, but the elimination of toxins was incomplete, as it continued during convalescence, the hypertoxicity of the urine persisting for four or five weeks after the cessation of the fever. In cases treated by cold baths the urotoxic co-efficient became five or six times greater than normal. This excessive elimination of urinary toxins diminished as the general symptoms ameliorated and as the temperature declined. With the appearance of apyrexia and the setting in of convalescence the urotoxic co-efficient became normal. It thus appears that the cold bath is not a specific in the treatment of enteric fever; neither does it exercise any influence upon the production of toxins.

In regard to surgical treatment for perforation, Fitz<sup>99</sup><sub>Oct. 1, 8</sub> states that it would seem to be wisest to wait until a probably encapsulated exudation proves unduly slow in being absorbed. Immediate or early laparotomy seems advisable only when the condition of the patient is exceptionally good. Should the signs indicative of exudation persist for a week or longer, and should the general condition of the patient permit an incision, surgical treatment may be undertaken.

#### AN ANOMALOUS FEVER.

Whitelegge<sup>2</sup><sub>Jan. 24</sub> reported an epidemic of an obscure form of fever that occurred in a prosperous English town of about 5600, most of whom were engaged in woolen and worsted work. Within a week of the time when the first cases were observed 100 mill-hands were down with the fever and 4 had died; but the disease was not confined to the mill-hands. No cause for the epidemic could be found in the water-supply or in the drainage. Among the workers in the mills the fever was most common in those less than 18 years old; in females; in the employés of one mill; and in those who worked upon the upper floors of the mill, especially in hot rooms. The dining-room in the mill was used by 170 persons, who brought their dinners with them; 100 took their meals in the work-rooms; and 340 went home or to eating-places. Among the first there were 30 cases; among the second, 5; and among the third, 9. Thus, those who took their meals in the

dining-room constituted but 28 per cent. of all, while they contributed 70 per cent. of the cases. The wool could not have been the source of contagion, because the sorters, who handled it first, escaped entirely; nor could the food have been at fault, for each brought his own. There were some 200 cases in those not employed in the mill. Some of these were undoubtedly cases of enteric fever; the larger number, however, resembled typhus, though in none was the rash seen. They were, for the most part, in young persons or children. The period of incubation was about a week; the attack set in suddenly, with fever and headache. There was much delirium, but no diarrhœa. The duration was generally from a few days to a week; some cases were prolonged to the second or third week; in these there were pulmonary complications; only 2, however, developed acute pneumonia. The total number of deaths was 18, of which only 2 were in cases that had been employed at the mill. It was impossible to obtain a single post-mortem examination.

In the discussion, Wynter Blyth<sup>2</sup><sub>Jan.24</sub> stated that recent researches had demonstrated the existence of several distinct forms of disease hitherto included in the designation of enteric fever. The ulceration of Peyer's patches might be caused by various microbes, and was, therefore, a common condition or accident, and not pathognomonic of one specific disease. Enteric fever will thus, ere long, have to be subdivided into several fevers, of which he thought this was one, as were other so-called anomalous forms. Meanwhile, the term "continued fever," though an expression of ignorance, should be retained for those cases in which the symptoms of true enteric fever were wanting. H. E. Armstrong said that, in twenty years of sole charge of a fever-hospital, he had found typical cases of enteric fever to be the exception, especially of late, and he had been in the habit of describing a large group as typho-enteric. Anomalous forms of typhus, on the other hand, were far less frequent, though intestinal hæmorrhage was occasionally met with even in typical cases.

#### TYPHUS FEVER.

Thoinot<sup>3</sup><sub>Sept.30</sub> reported the occurrence of an epidemic of typhus fever on the Isle of Tudy, lasting from May to August, involving 80 persons, and attended with 16 deaths. Among those over 50

years old 5 out of 7 died. Investigation demonstrated that neither the water nor the air was the vehicle of infection. Transmission was invariably the result of direct contact. Of 82 indigenous cases, 42 were among the members of a single family. It would appear that the germ of the disease is contained in the cutaneous secretion, and that the eruption is an important manifestation. Isolation of the sick was scrupulously observed, and feeble sublimate solutions were daily applied to the surface of the body. The rooms previously occupied by the sick were thoroughly disinfected. The clothing and linen were disinfected by immersion in a solution of mercuric chloride (1 to 1000); mattresses were burned. Zieniec,<sup>520</sup><sub>No. 41, '90</sub> in 103 cases of typhus fever, found that there was a continual loss of weight during the febrile period. As the fever subsided weight began to return. The daily loss of weight reached 0.7 per cent., the daily gain 0.8 per cent. In patients between 16 and 30 the figures were nearly alike; in those younger the decline was slower and the ascent more rapid; in older patients the reverse was the case. The less the loss of weight during the febrile period, the greater was the gain in the crisis, and *vice versâ*. The loss of weight was smaller as the temperature was higher. The loss was greater and lasted longer after the administration of antipyretics, while the weight increased more slowly, and convalescence was retarded. The daily loss of weight bore an inverse proportion to the body-weight before the fever. In fatal cases the daily loss of weight was twice as large as in cases that recovered.

#### MALARIAL FEVERS.

Romanowsky,<sup>21</sup><sub>Aug. 24, 31</sub> by a special method of staining, was able to distinguish the structure of the organism and to discern progressive changes in the nucleus attendant upon the growth and development of the parasite of malaria, as well as regressive changes induced by the administration of quinine. The administration of a tincture of helianthus (sunflower) seemed to retard the development, but failed to cause destruction. Quinine may thus not only empirically, but also biologically, be considered a true specific in malarial fever. The blood was examined in 50 non-malarial cases, but parasites were not found. Prout,<sup>6</sup><sub>Aug. 1</sub> has described the varieties of malarial fever encountered on the Gold Coast of West Africa. Well-marked intermittent fever is rare. The natives and Europeans

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.

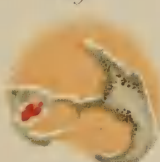


Fig. 8.



Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.



Fig. 14.

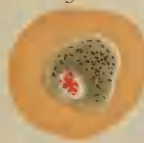


Fig. 15.

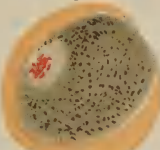


Fig. 16.



## Malaria. (Romanowsky.)

*Fig. 1. Free Parasites. Fig. 2 to 6. Intracorpuseular Parasites in various Stages of Development. Fig. 7 to 8. Mature Intracorpuseular Parasites. Fig. 9 to 12. Parasites in Process of Division (Karyomitosis). Fig. 13 to 16. Changes in Intracorpuseular Parasites after the Administration of Quinine.*

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that survive the first few years of continuous residence display a mild type of fever, characterized by sudden onset, with slight shivering, rise of temperature to  $104^{\circ}$  or  $105^{\circ}$  F. ( $40^{\circ}$  to  $40.6^{\circ}$  C.), headache, pains in the loins and limbs, a sense of discomfort, dryness of the skin, and a feeling of intense heat, followed by copious sweating. The disease is readily controlled by mercury and quinine. In recent arrivals the first attack is usually of considerable severity, partaking of the characters of bilious remittent. It is sometimes preceded by a sense of well-being, but more usually by a feeling of malaise, anorexia, deranged digestion, constipation, and mental impairment. A cold stage is usually not observed. The temperature rises rapidly, and may reach  $106^{\circ}$  F. ( $41.1^{\circ}$  C.); soon declining, though perhaps not to the normal. Pains in the loins and extremities occasion much discomfort and restlessness. The tongue is heavily coated; nausea is invariably present; vomiting often constitutes a dangerous symptom. The spleen is enlarged and tender. There is tenderness at the pyloric extremity of the stomach, and sometimes along the hepatic margin of the ribs. The stools are dark green in color and offensive in odor. Recovery is gradual and tedious. Malarial hæmoglobinuria occurs. In Europeans, debilitated and anæmic from previous attacks of fever, as a result of anxiety, or work, or excesses, the attack sets in suddenly, perhaps with shivering. Vomiting occurs early, and is a prominent and intractable symptom. The tongue and breath are foul, and there is great thirst. The skin, conjunctivæ, and buccal mucous membrane are of a canary-yellow color. The temperature may not be high; it may become normal, although the other symptoms persist. If subsequently the temperature continues to rise, without remission, the prognosis is unfavorable. The urine is diminished in quantity, and is porter-colored; it contains albumen and blood-pigment and pigment-casts, but few or no blood-cells. If recovery is to ensue the symptoms gradually improve. On the other hand, the symptoms may become aggravated; the urine may be suppressed, and death may result from uræmia. In 8 of 10 cases in which examination was made changes were found in the blood. In these cases the red corpuscles contained brightly refracting rod-like bodies, of varying number and size, presenting pulsatile movement; brightly refracting round spots, of different sizes, sometimes in association with the rod forms; large circular bodies, resembling

vacuoles, lying either in the centre of the corpuscle or at its periphery, also sometimes in association with rods; and irregular transition forms. Three cases presented bodies, in appearance resembling tadpoles or spermatozooids, and possessing a limited power of movement. In 5 cases pigmented bodies were observed; small corpuscles, about as large as leucocytes, containing dark-brown granules, evenly distributed; bodies two or three times as large as the preceding, containing similar granules of pigment, but arranged around clear spaces; finely pigmented bodies, possessing amœboid movement; and amœboid bodies, containing large masses of black pigment.

Nepveu<sup>46</sup><sub>Oct. 15</sub> found five organisms in the blood of malarial patients in addition to those already known. One is a biscuit-shaped bacterium, in form and dimensions resembling the bacterium coli, and sometimes provided with delicate flagella; the second is a paludal streptococcus, arranged as a fine chain, of from twelve to fifteen parts, terminating at each extremity in a small vesicle; the third is a buoy-shaped bacterium, consisting of a bright vesicle, presenting a projection at each pole; the fourth variety is a spirillum, sometimes isolated, sometimes arranged in zoöglæa masses; the fifth is a keel-shaped bacterium, the dorsal aspect of which is rectilinear, the ventral aspect distended, each extremity being provided with a flagellum. This organism moves with great activity, and attaches itself to a red corpuscle. Nepveu has also found sporules in the intestinal villi, ovoid spores, asteroid amœboid bodies, spherical bodies, club-shaped bodies, some with flagella in the blood, and sickle-shaped bodies in the kidneys, liver, and spleen. A second variety of hæmamœba, smaller than that described by Laveran, was also observed. Sakharoff<sup>262</sup><sub>July</sub> has detected, in the blood of patients suffering from irregular malarial attacks, small, pale bodies, that are not found in the blood of those presenting malarial manifestations of regular type. These bodies are inclosed within the blood-corpuscles, and are endowed with amœboid movement. In the course of development pigment-granules appear; mobility is gradually lost, and a round shape is assumed. The granules accumulate at the side or at the centre of the parasite, and the nucleus, previously visible, becomes indistinguishable. The parasite meanwhile increases in size, though it never becomes as large as the blood-corpuscle in

which it is contained. By and by, fission takes place. At its conclusion the segments, from four to sixteen in number, escape, and remain free or are taken up by leucocytes. Sometimes the course of development is more rapid, and fission begins before the formation of pigment. At other times new crescentic forms appear, and the disease assumes a chronic course. Sakharoff expresses the opinion that, in cases in which the crescentic bodies occur, the fever seldom assumes a recurrent type. He considers the crescentic as undeveloped bodies, although the amœboid parasites may be present in large numbers from the beginning. The former may be found in the blood of patients having irregular malarial attacks, but they are seldom observed in the course of regular malarial manifestations. The crescents are gradually transformed into oval or round bodies. Generally some of the round bodies develop motile filaments; ultimately they disappear and leave no trace. Attempts to cultivate the parasites have failed. Fowls have proved insusceptible to inoculation. Although fowls are said to suffer from malaria, the parasite has not been found in their blood. A hitherto undescribed spiral parasite has been found in the blood of some geese in a highly malarious region of the Caucasus.

Okuneff<sup>90</sup><sub>Dec., '90</sub> has recorded the results of a series of 63 careful observations, in 19 cases of quotidian and 5 of tertian intermittent fever, to determine the variations in the blood-pressure, in the cutaneous and internal temperature, in the pulse and respiration, and in the cutaneous and pulmonary transpiration during the stages of rigor, of fever, and of sweating. At the beginning of the period of rigor the blood-pressure usually falls, subsequently to rise again to the maximum. In the stage of fever the tension oscillates above the normal, though not rising so high as in the period of rigor, subsequently to fall to or below the normal; in the stage of sweating the pressure falls below the normal, sometimes considerably. As a rule the pulse is most frequent during the period of fever, with moderate elevation of the arterial tension. In a certain proportion of cases, however, the maximum acceleration may take place in conjunction with the highest degree of tension (in the cold stage), or with the lowest degree (in the sweating stage). There is no apparent parallelism between the frequency of breathing and the course of the bodily temperature.

The axillary temperature rises in the cold stage, attains its maximum in the hot stage, and returns to the normal in the sweating stage. The rectal temperature is commonly from  $0.1^{\circ}$  to  $1.5^{\circ}$  C. ( $0.18^{\circ}$  to  $2.70^{\circ}$  F.) lower in the cold stage than is the axillary temperature. In the hot stage the rectal temperature is from a few tenths of a degree to a degree higher than the axillary temperature, while in the sweating stage the former is from  $0.6^{\circ}$  to  $1.6^{\circ}$  C. ( $1.08^{\circ}$  to  $2.8^{\circ}$  F.) higher than the latter. In the cold stage the cutaneous temperature of the abdomen and chest remains either normal or subnormal, but in the hot stage it rises above the normal, to return to the normal with the onset of sweating. The femoral temperature remains normal during the cold and hot stages, but falls below the normal in the sweating stage. In the stage of chill there is diminished cutaneous and pulmonary transpiration. This begins to increase in the hot stage, and increases still more in the sweating stage.

Golgi<sup>58</sup><sub>B.10,p.168</sub> claims to have been the first to demonstrate that the different forms of parasites observed in the blood of individuals suffering with malarial disease are but modifications of one form, and that these metamorphoses follow one another according to a fixed law. The development takes place in and leads to the destruction of the red corpuscle. The amœboid parasite, at first small and impigmented, increases in size at the expense of the red cell, becomes pigmented, and, after passing through a series of metamorphoses, finally multiplies by segmentation. The process of segmentation corresponds with or slightly precedes the onset of the febrile paroxysms. The pigment-granules contained in the body of the parasite do not participate in the process of segmentation, on the completion of which they are set free in the blood-current, to be taken up by the white blood-cells and the cells of the liver. The period of time that elapses between the entrance of the parasites into the red blood-corpuscles and their segmentation constitutes the apyretic interval. It is thought that tertian fever depends upon the presence in the blood of a distinct variety of parasite, the development of which occupies two days.

Laveran<sup>3</sup><sub>Dec.3,'90</sub> states that the blood should be examined with the onset of fever. The patient should not have taken quinine for some time previously. The blood may be examined in its recent condition or it may be dried. It is obtained by puncture

of a finger previously washed; for the purpose a needle sterilized in the flame of a lamp is employed. The drop of blood that appears after the puncture has been made is received upon a cover-glass, and is distributed in a thin layer by means of a second cover-glass placed upon the surface of the first. The examination is preferably made by daylight; a good dry objective is sufficient with which to recognize the parasites. The flagella are most often observed at the borders of the free, pigmented, spherical bodies. To examine the dried blood, one cover-glass is slipped over the other and the blood is permitted to dry; the cover-glass is then passed three times through the flame of a spirit-lamp. If the specimen is not stained the crescents may be detected; but, in order to see the spherical bodies, it is necessary to treat the cover-glass with equal parts of alcohol and ether, then to stain with a concentrated solution of methylene blue, to wash in water, and to dry. In blood prepared in the manner indicated the nuclei of the leucocytes are colored deep blue; the spherical bodies, pale blue; while the crescents are scarcely stained. Examination of fresh blood permits only of the detection of flagella, and, if one is familiar with the hæmatozoa, gives the best results; but the examination of the dried and stained blood is easier, while the preparations are permanent.

Toulmin <sup>9</sup><sub>Sept. 19</sub> emphasizes the clinical importance, for purposes of diagnosis, prognosis, and treatment, of examinations of the blood to determine the presence or absence of the organisms of malaria, and fortifies the position he takes by a recital of cases, the true nature of which, without such examinations, might have remained doubtful if not unrecognized.

Joseph Levi, corresponding editor, Colon, <sup>673</sup><sub>June, July</sub> describes the types of malarial fever observed at the Isthmus of Panama, in the order of their frequency, as intermittent and remittent fever, chronic malarial toxæmia, and pernicious malarial fever. New arrivals usually succumb to the last. Pernicious malarial fever is only less dangerous than yellow fever, for which it is not rarely mistaken. The manifestations of chronic malarial toxæmia are most diverse. Among other manifestations are enlarged spleen, anæmia, and a pale, dirty-yellow complexion. There is slight jaundice, together with various neuralgias. For most of the cases the only remedy is change of climate. Women present amenorrhœa, dys-

menorrhœa, ovarian neuralgias, and hysteria, as sequelæ. The prognosis is governed by the previous condition of health and by the mode of living. Quinine is the only reliable remedy. It occasionally fails,—for instance, when large doses have been taken prophylactically. Exceptionally, too, an idiosyncrasy may be encountered, rendering the employment of quinine out of the question. The following formula is recommended, the bowels having been previously acted upon:—

R Quinina sulphatis,	. . . . .	gr. v (0.32 gramme).
Pulvis pepsini porci,	. . . . .	gr. iij (0.19 gramme).
Pulvis capsici,	. . . . .	gr. ss (0.032 gramme).
Pulvis zingiberis,	. . . . .	gr. j (0.065 gramme).
Sodii bicarbonatis,	. . . . .	gr. v (0.32 gramme).

M. Fiat pulvis.

Sig.: To be taken every half-hour or hour, as required, until the fever subsides. Subsequently, half of the quantity is to be given every two or three hours.

An occasional hypodermatic injection of  $\frac{1}{8}$  grain (0.0081 gramme) of morphine is beneficial. The tenderness over the spleen is relieved by inunctions of the ointment of the red iodide of mercury. In chronic cases iron, quinine, and arsenic are indicated. Potassium permanganate is often of service, especially in females with menstrual derangement. The death-rate among children is highest before the period of dentition. Subsequently, tolerance or resistance to infection seems to be established. In many cases general anasarca develops. Quinine alone is insufficient in treatment. When serous effusions have taken place tapping, followed by the administration of infusions of buchu and of digitalis, is useful. In many cases hydrocele is thought to be related to malarial infection. The best results are obtained by injections of port wine. Hæmaturia is to be treated with tannin and quinine, administered alternately.

Delmas<sup>243</sup><sub>May</sub> divides the malarial remittent fever of Algeria into a mild and a grave type. Both of these may be subdivided into forms in which general and local symptoms respectively predominate. The ordinary form of remittent fever belongs to the mild type, and is characterized by a predominance of constitutional symptoms. Local manifestations of mild remittent fever may be especially referable to the digestive, the respiratory, or the locomotive system. The digestive derangement may partake of a gastric or of a bilious character. The gastric symptoms may be mild or

grave. The respiratory symptoms are principally bronchial, and the locomotive are rheumatoids. The last may be muscular, fibro-muscular, or articular. The grave type of fever in which constitutional manifestations predominate may be characterized by hyperthermia, by adynamia, or by a typhoid condition. When local manifestations predominate in grave remittent fever, the symptoms may be especially referable to the cerebro-spinal, the digestive, the respiratory, the circulatory, or the locomotive system. The symptoms of the cerebro-spinal type of fever may be cerebral, bulbar, or meningeal. Among cerebral symptoms delirium or coma may be conspicuous. Bulbar involvement is manifested by syncope. The digestive type of fever may be further subdivided into a dysenteric and an hepatic form; the respiratory, into a pneumonic or a pleuritic. Hepatic remittent fever may be of inflammatory or of icteric type. Pneumonic remittent fever may be subdivided into a croupo-pneumonic and a broncho-pneumonic type, and the latter again into a catarrhal and a suffocative. The circulatory type is characterized by cardialgia, the locomotive by rheumatoid pains and grave complications.

James<sup>1</sup><sub>Apr. 25</sub> reported the results of examinations of the blood in 400 cases regarded as of malarial origin. The cases presenting an intermittent type of fever, in which malarial organisms could not be found, proved, on further observation, or at autopsy, to be other than malarial; those cases, on the other hand, in which plasmodia were found in the blood, presented a striking uniformity of symptoms, with evident enlargement of the spleen. In 98 per cent. of the latter cases there was a history of exposure to miasmatic infection. In only a few severe cases presenting a remittent type of fever could plasmodia be found; these cases had been exposed to malarial infection. In the milder, more irregular, indigenous cases, organisms could not be found in the blood; nor was the spleen, with any constancy, enlarged. In cases of non-malarial disease, in which there was, nevertheless, a possible malarial element, plasmodia were found in but a single instance. In none of the cases of headache, neuralgia, malaise, etc., of a periodic tendency, were plasmodia found. In the discussion Delafield stated that, in New York, patients are seen with fever that is not typhoid or typhus, or that is not dependent upon tuberculosis or upon inflammation in any part of the body. Such persons suffer from fever as a

disease. Some have distinct paroxysms, characterized by daily fever and sweating, occurring at regular intervals, either every day, every other day, or every third day. Such cases are much less common than they were a few years ago. Other cases present paroxysms of fever not preceded by chill, or necessarily followed by sweating, the intervals being the same as in the preceding variety, and the attacks being characterized by high temperature. Other cases present a continuous fever, lasting about two weeks, with a well-marked febrile movement, headache, and more or less prostration. Such cases always recover perfectly, but they are difficult to distinguish from cases of typhoid fever. Some other cases present a fever coming and going, seldom lasting twenty-four hours, and the temperature never ranging very high. The fever might continue for a week or two, every day or every other day; but there is no regular order for the attacks, which may go on for months or years. These fevers behave capriciously to remedies. In some instances quinine is effective and in others useless; in some Warburg's tincture does good, while in others it causes nausea and gives rise to diarrhœa. Arsenic is also uncertain in action. The patients do best if sent out of the city, but recurrence is probable on their return. It is imperative to recognize that there are fevers that simply give rise to fever; there is a great deal lacking in the matter of treatment, but it is clearly wrong to go on dealing with the cases as if they are all of purely malarial origin.

Torti and Angelini<sup>589</sup><sub>June 26</sub> have reported the occurrence of symptoms of cerebro-spinal sclerosis in 2 young men suffering from chronic malarial poisoning. On examination of the blood many malarial parasites were found. A course of quinine and arsenic was followed by recovery. Celli<sup>8</sup><sub>Nov. 27, '90</sub> emphasizes the desirability of careful statistical data as to the geographical distribution of malarial disease.

Hocssinger<sup>113</sup><sub>No. 17</sub> has succeeded in finding the plasmodia of malaria in 24 cases of malaria in children, who are especially prone to malarial infection during the first two years of life. The disease pursues an atypical course, and is rarely diagnosticated. The initial chill is never observed; sweating is usually wanting; the intermissions are illy defined. A child suffering with malarial fever runs down in health, develops a sallow complexion, becomes anæmic, and loses flesh,—symptoms that may spontaneously dis-

appear, but that are speedily removed by the administration of quinine. To examine the blood for plasmodia, cover-glass preparations are made, dried in the air, and subsequently fixed by immersion for half an hour in a combination of equal parts of alcohol and ether. The preparations are then stained by means of a solution consisting of about 3 ounces (93 grammes) of concentrated aqueous solution of methyl-blue, to which a few drops of absolute alcohol and then  $7\frac{1}{2}$  grains (0.54 gramme) of eosin dissolved in water are added. The solution is sterilized by boiling, and preserved in a tightly-corked bottle. For use, a small quantity is filtered into a watch-glass, and the prepared cover-glass, inverted, is permitted to float on the surface for at least ten or fifteen minutes after the solution has been previously warmed. The cover-glass is next washed in water, dried between filter-paper and then over a spirit-lamp, and finally mounted in Canada balsam. The red blood-cells are stained rose, the nuclei of the leucocytes a very dark blue, and any plasmodia that may be present are stained a delicate sky-blue. Segmented amœboid bodies were never absent in infants. The plasmodia were sought for, but were never found in other than malarial diseases.

*Atypical Forms.*—Humphreys<sup>85</sup><sub>Oct</sub> reports that a certain number of cases recognized as malarial do not bear quinine well. In them an intermittent or remittent fever, if permitted to run its course, becomes continuous and often pernicious. If quinine be administered to cinchonism, the fever assumes a milder type, or hæmaturia develops; but, if the quinine be withdrawn, the paroxysms cease and the temperature declines. Subsequently, a teaspoonful of spirits of nitrous ether and 2 or 3 grains (0.13 to 0.19 gramme) of potassium chlorate are administered alternately every two or four hours.

*Complications.*—Diberoor<sup>363</sup><sub>Feb.21</sub> has recorded 2 cases, characterized by ulcer of the tongue, which obstinately resisted both dietetic and local treatment. The possibility of the dependence of the lesion upon malarial infection suggested the employment of quinine, following which the ulceration rapidly disappeared.

Dwight<sup>1</sup><sub>Jan.10</sub> has reported an epidemic of disease, presumably malarial, in which the cases presented pains in the loins, frequent micturition, weakness, dyspnœa, vertigo, headache, feeble and rapid pulse, endocarditis, and pericarditis. The urine varied, in specific

gravity, between 1002 to 1008. In some cases the urine contained albumen. Some of the cases complained of cough. Six female patients presented manifestations of derangement of the function of the bladder. Fever was not invariably present. In several cases there was vomiting and purging. Four cases terminated fatally. A wide range of treatment was employed.

*Treatment.*—Laveran, <sup>31</sup><sub>Feb. 19, 20</sub> admits that, when the condition is not acute, a cure may be effected by institution of a tonic and reconstructive plan of treatment into which quinine does not enter. Of all tonic remedies arsenic remains by far the most potent in the dissipation of rebellious forms of malarial disease and of the malarial cachexia. The drug, however, must be administered in small doses. Doses large enough to occasion gastric derangement do harm. For acute malarial disease, however, quinine is indispensable. It is probable that the efficacy of quinine in paludal disease depends upon a specific destructive action upon the hæmatozoa. The hydrochlorate of quinine is the preferable salt, because of the large proportion of quinine it contains. On account of its great solubility the neutral hydrochlorate is to be preferred to the basic hydrochlorate. For hypodermatic injection, 5 grammes ( $1\frac{1}{4}$  drachms) of the former may be dissolved in sufficient distilled water to make 10 cubic centimetres ( $15\frac{1}{2}$  grains), so that each cubic centimetre of the solution contains 50 centigrammes ( $7\frac{3}{4}$  grains) of the hydrochlorate. Should the neutral hydrochlorate not be available, 5 grammes ( $1\frac{1}{4}$  drachms) of basic hydrochlorate of quinine may be added to 5 cubic centimetres ( $1\frac{1}{4}$  drachms) of a solution of hydrochloric acid in distilled water of a specific gravity of 1045; sufficient distilled water is added to make 10 cubic centimetres ( $2\frac{1}{2}$  drachms); the resulting solution is filtered. The injection causes pain, but does not cauterize. As a substitute, 1 gramme ( $15\frac{1}{2}$  grains) of basic hydrochlorate of quinine may be mixed with 3 grammes ( $\frac{3}{4}$  drachm) of alcohol and 6 grammes (96 minims) of water; and to the mixture sufficient hydrochloric acid is added to make a perfect solution. At ordinary temperatures a cubic centimetre of the solution contains a decigramme of the salt. Kobner has proposed to dissolve from  $\frac{1}{2}$  to 1 gramme ( $7\frac{3}{4}$  to  $15\frac{1}{2}$  grains) of hydrochlorate of quinine in 2 grammes (40 minims) each of pure glycerin and distilled water. A solution of 1 gramme ( $15\frac{1}{2}$  grains) of quinine sulphate in 10 grammes ( $2\frac{1}{2}$  drachms) of distilled water and 50 centigrammes

( $7\frac{3}{4}$  grains) of tartaric acid may also be employed hypodermatically. Care should be taken that the solution is clear, containing neither crystals nor spores, and that the injection is made into the subcutaneous tissues.

Atkinson<sup>15</sup><sub>July</sub> recommends a combination of tincture or of extract of eucalyptus and quinine, with a morning saline, frequently repeated. Duncan<sup>6</sup><sub>Sept. 26</sub> shows that, while arsenious acid exerts little or no prophylactic influence, quinine and cinchona do exert such an influence. Guttman and Ehrlich<sup>84</sup><sub>Oct. 24</sub> reported the successful employment of methylene blue. Seven and one-half grains (0.5 gramme) were given six hours in advance of the time of the expected attack, and, subsequently,  $1\frac{1}{2}$  grains (0.097 gramme) or more, five times daily.

The nature of the continued fever of the Southern United States is still a matter of discussion. Barber<sup>117</sup><sub>Feb.</sub> and Howett<sup>85</sup><sub>Jan.</sub> conclude that it is really enteric fever, while Shapard<sup>760</sup><sub>Jan. 3</sub> considers it a hybrid affection,—one element predominating in certain localities, another element in other localities. Mason<sup>82</sup><sub>Apr. 11</sub> states that, in Arkansas, there occurs a continued fever, known as “slow fever,” which is most prevalent in autumn and winter, and which sets in with a chill followed by fever. Headache, nausea, and tympanites are also present. In treatment an initial dose of quinine may be given, to be followed by the administration of carbolic acid and solution of potassium arsenite. The continued administration of quinine appears to aggravate the symptoms and occasionally to cause rigors.

*Relapsing Fever.*—Neal<sup>235</sup><sub>Dec., '90</sub> has recorded 6 cases of relapsing fever of 10 under observation. The most constant symptoms were nausea and bilious vomiting, jaundice, pains in the muscles and joints. The duration of the first febrile period was from three to five days; of the first intermission, from five to ten days; of the second febrile period, from three to five days; of the second intermission, when a third paroxysm occurred, one day. The third paroxysm lasted scarcely longer than a day.

#### VARIOLA.

Eternod and Haccius<sup>87</sup><sub>Jan. 31</sub> claim to have succeeded in inducing cow-pock by inoculation of calves with virus obtained from cases of small-pox in man. They ascribe their success to their

method of procedure: vaccination by denudation, as they call it. The skin of the animal, in an area of several square centimetres, is carefully washed and shaved, and then scarified by means of glass-paper. The little blood and the little serum that appear are wiped away, and to the denuded surface the virus is applied by means of a spatula. As a result of their experiments, Eternod and Haccius maintain that variola is inoculable in the bovine species when the mode of operation is good and the virus is obtained at the proper time. The inoculation of variola in calves constitutes a valuable means of supply of animal vaccine, and in the course of several generations becomes transformed into cow-pock. By virtue of an enormous and extensive experimental experience, Chauveau <sup>10</sup><sub>Oct. 20, 27</sub> insists upon the rigid distinction of variola and vaccinia. He repels the attempts to consider the virus of vaccinia as either a transformation or an attenuation of the virus variola. He maintains that the virus of vaccinia never gives rise to variola in man, and that the virus of variola never gives rise to vaccinia in the cow or in the horse.

Molitor <sup>454</sup><sub>Sept.</sub> formulates the following conclusions, based upon the vaccination of the recruits and soldiers of a garrison for the year 1890: It is important to vaccinate the newborn as early as is possible. Children should be revaccinated at about 5 years of age. Persons who have had small-pox should be vaccinated four or five years after the attack if the disease has been contracted in early infancy; but if the attack has occurred after 5 years of age, vaccination should be performed after an interval that should not exceed eight years, or at most ten years. Some persons present a remarkable vaccino-variolous tendency that is only to be overcome by frequent revaccination. Such instances are probably not as rare as one might believe. In more than 6000 cases the number was about 2 per cent. It is thus prudent to make a test revaccination, preferably at an early age. Persons who present this tendency should be revaccinated every two or three years, until the protection is absolute. If the test revaccination is negative, it suffices to repeat the operation after an interval of from seven to ten years, according to the age of the subject. Under all circumstances, the first revaccination should be made not later than five years after the primary vaccine inoculation.

Steel <sup>6</sup><sub>Jan. 24</sub> records 3 cases of accidental vaccination. Two oc-

curred in mothers of whom the children had been vaccinated, and the third in a milkman, who had milked a cow with an eruption on its udder and teats, supposed to be cow-pock. Darling<sup>2</sup><sub>Dec. 13, '90</sub> describes the case of a farm-servant, 17 years old, who had been successfully vaccinated as an infant, and who presented on the hands and lower lip vesicles that ruptured and dried up and formed crusts. Careful inquiry disclosed the fact that the girl, in the performance of her duties, milked a cow that presented sores on its teats, from which infection had taken place through fissures of the skin. Subsequently an urticarious eruption appeared upon the arms and upon one side of the face. Felkin and Buist<sup>36</sup><sub>July</sub> reported 9 and 3 cases, respectively, in which persons were accidentally vaccinated by contact with the virus from the pustules of other individuals vaccinated in the usual way.

Jacquemard<sup>228</sup><sub>Jan. 16</sub> has recorded the results of observations, made at the Hôtel Dieu, in 194 cases of variola in males, seen in the course of an epidemic at Saint Etienne during the period from March, 1889, to November, 1890. Six cases were hæmorrhagic. These were in individuals between 31 and 50 years of age. Three of these had been successfully vaccinated at an early age, but had not been revaccinated. One had been vaccinated at an early age, and successfully revaccinated two years previously; another had been vaccinated twice, the last time twenty-six years previously; in the sixth case it was not possible to learn if vaccination had been performed, nor could a cicatrix be discovered. In all 6 cases the prodromal symptoms were pronounced, especially the rhachialgia, but they moderated with the appearance of the eruption. Five of the cases terminated fatally; 1 after copious hæmorrhage. In 4 of the cases the urine was albuminous. There were 32 cases of confluent variola; these were mostly in individuals between 10 and 30 years old. Fourteen only had been vaccinated in childhood; 11 had not been vaccinated at all. In 25 cases the eruption first appeared upon the face; in 2 cases the eruption displayed a tendency to become hæmorrhagic. In a considerable number of cases dilatation of the carotids, with violent pulsation, was a conspicuous manifestation; most of these cases were fatal. Among the 32 cases there were 14 deaths, of which 4 occurred in individuals vaccinated at an early age and 8 in those who had not been vaccinated at all. In 1 fatal case localized œdema and a

circular area of sphacelus, descending in the length of the leg, were followed by dry gangrene and spontaneous amputation of the foot; in a second fatal case an area of infectious œdema appeared on the right upper extremity. In neither of these cases was any vascular obstruction found after death. In 1 case œdema of the larynx occasioned a fatal result. Broncho-pneumonia occurred as a complication in 1 case. A case complicated by pleurisy, with effusion, terminated fatally. Thirteen cases presented albuminuria. The most common complication was the development of subcutaneous abscesses. Sixty cases of discrete variola were treated. The largest number of these were also between 10 and 30 years old. Thirty-three had been vaccinated only once,—at an early age; 2 had not been vaccinated at all; in 21 cases the matter of vaccination was doubtful; in 37 of the cases the eruption first appeared upon the face; in 1 case aphonia appeared; in another there was broncho-pneumonia. A child presented incontinence of urine and of fæces. Dysentery occurred in 1 case. In 12 cases the urine was transitorily albuminous. Staphyloma of the cornea appeared in a child. The most common complication, as in the case of confluent small-pox, was the development of subcutaneous abscesses. Among the 60 cases there were 2 deaths: 1 from erysipelas and 1 from capillary bronchitis and catarrhal pneumonia. There were 96 cases of varioloid, of which nearly five-sixths were between 10 and 30 years old; one-sixth were between 30 and 40. Ninety of the 96 had been vaccinated; 75 had been vaccinated at an early age, but had not been subsequently revaccinated. The eruption appeared first upon the face in 79 cases. In all of the cases of varioloid sudden defervescence occurred with the appearance of the eruption, and the temperature did not again rise. None of the cases died. Complications were few and slight. In 3 cases the eruption appeared twice. The largest number of cases were admitted in April, May, March, and December, respectively. Therapeutically, all of the cases were divided into two classes. In the one only a tonic treatment was employed; this included quinine and alcohol. In the other class of cases methods of treatment for which specificity had been claimed were employed; this included cocaine and a spray of corrosive sublimate. As a result of careful comparative observations, it was concluded that the latter possessed no decided advantage over the former. Cocaine

exercised a palliative influence upon the pains of the engorged skin at the onset of the eruption, while the spray of corrosive sublimate seemed to exercise a favorable influence upon the suppurative stage of the disease and in the prevention of deep cicatrices. The best treatment of variola is the prophylactic treatment. It is important to insist upon vaccination and revaccination.

According to Neve,<sup>5</sup><sub>May</sub> periostitis, epiphysitis, necrosis, and arthritis may occur as sequelæ of the exanthemata, especially small-pox. They usually, but not invariably, appear late in convalescence. Arthritis is the lesion most characteristic of small-pox.

Boinet,<sup>72</sup><sub>July 28</sub> has reported the case of an anæmic woman, 32 years old, in whom symptoms of cerebro-spinal sclerosis developed as a sequel of variola. He excludes hysteria, and considers the case as one of pseudo-sclerosis.

#### YELLOW FEVER.

Kemp<sup>79</sup><sub>Apr.</sub> has reported the results of a microscopical, spectroscopical, and chemical study of the black vomit in 5 cases of yellow fever and in 2 of malarial fever, respectively, from which it appears that the source of pigment in each case is the pigment of the blood acted upon by the juices of the stomach. In addition, the matter vomited in case of malarial fever contains considerable quantities of bile-pigments and bile-salts, which are wanting in the vomited matter of yellow fever. It is postulated that, in a doubtful case, should the vomited matter be acid, containing coffee-ground flakes in a clear, colorless, yellowish or reddish fluid—the flakes constituted of red blood-corpuscles—and should the vomited matter contain no bile, the case is probably one of yellow fever. If, on the other hand, the vomited matter is feebly acid; is thick, grumous, and of a dirty, brownish-green color, and if bile be present, the probability is that the case is one of malarial fever.

*Prophylaxis.*—Cochran<sup>647</sup><sub>June</sub> brings out the fact that, since the discovery of America, epidemics of yellow fever have occurred in the United States during ninety-three years, in eighty-one of which there was evidence of its source. Seventy-five times the disease was brought from the West Indies, especially from Havana. The best means of preventing its introduction consists in careful inspection and quarantine at the port of departure of vessels. In the absence of this, inspection-stations and refuge-stations should be

established; the former to look after vessels coming from infected ports, but with clean bills of health, and with no history of infection, and in regard to which the presumption is that they are not dangerous; refuge-stations should care for vessels without clean bills of health, or with a history of infectious disease during the voyage, or which, for some reason, are suspected of being infected. At inspection-stations provisions should be made for scrupulous disinfection. Refuge-stations require, in addition, hospitals and warehouses. The process of disinfection includes (1) ventilation, (2) cleanliness, (3) sulphur fumigation, (4) flooding with solutions of mercuric chloride, and (5) the application of dry and moist heat is to be directed to the ship, its ballast, the cargo, the baggage and bedding of the passengers, officers, and crew.

*Protective Inoculation.*—Finley and Delgado<sup>5</sup><sub>Sept.</sub> have, during a period of ten years, made a series of experimental observations upon the inoculation of 67 healthy persons—by mosquitoes—with the blood obtained from patients with yellow fever. They conclude that the inoculations are unattended with danger. The most pronounced effect was the development, in 18 per cent. of cases, of a benign form of yellow fever, with subsequent immunity. The inoculations are credited with the facility of acclimatization, observed in 94 per cent. of cases. Of the non-inoculated, but 65½ per cent. became readily acclimatized; of the inoculated, but 6 per cent. developed yellow fever, with a mortality of less than 2 per cent., while ordinarily the proportion is 19 per cent., with a mortality of 15½ per cent. The mosquitoes rapidly lose their infective power, which is intensified by successive stings of the same insect upon patients with yellow fever. Inoculations made during the cold season should not be considered sufficiently protective; they should be repeated on the approach of summer.

*Treatment.*—Le Roy de Méricourt<sup>3</sup><sub>Mar. 25</sub> describes a method of treatment for yellow fever, by means of cold, as carried out by Garcia, of Santiago. The patient is placed on low diet, in an inclosure with double walls, the space between which is packed with ice, until the temperature within has been reduced to between 10° and 0° C. (50° and 32° F.). It is conceived that the cold sterilizes the air of the chamber and accomplishes a lavage of the blood. Being rapidly absorbed by the mucous membrane of the respiratory tract, the air mixes with the blood, diluting the soluble

poisons contained, increasing the renal tension, and acting as a powerful diuretic. Thirst is generally wanting. Of 20 patients treated in the manner indicated, only 2 died.

Freire<sup>69</sup><sub>Apr. 23</sub> reports a mortality of  $\frac{4}{10}$  per cent. among 10,885 cases treated by inoculation in the period from 1883 to 1890. It is stated that the majority of those inoculated were susceptible individuals, largely made up of recent arrivals in the theatre of infection. Freire makes yellow fever dependent upon the *amaril* microbe (micrococcus or cryptococcus xanthogenicus), an organism having a diameter of a micromillimetre, and appearing isolated or in chains. The inoculations are made with attenuated cultures of this organism.

#### WEIL'S DISEASE.

Chéron<sup>100</sup><sub>Feb. 14</sub> comes to the conclusion that Weil's disease depends upon an intoxication of intestinal origin, or upon the absorption of ptomaines developed outside of the body, and accidentally introduced through the medium of food or drink. The treatment is purely symptomatic. At the onset it is well to give a purgative, or, better, an emetic. A milk diet is advisable. Tonic doses of quinine may be given. Leiblinger<sup>84</sup><sub>May 16, 23</sub> adduces a number of facts in support of the view that the complex of symptoms known as Weil's disease does not constitute a disease *sui generis*, but is only the result of a resorption icterus secondary to acute articular rheumatism. Both Weil's disease and acute articular rheumatism are specific, non-contagious diseases. Both occur most commonly between the fifteenth and thirteenth years of age. Jaundice has been noted in a not inconsiderable number of cases of acute rheumatism. Arthralgia and myalgia are common to rheumatism and Weil's disease, as are also articular crepitation and œdema of the extremities. The absence of sweating in Weil's disease is attributed to the existence of jaundice, and this in turn is thought to be dependent upon a catarrhal condition of the biliary passages, as part of a general inflammation of the mucous membranes. Renal disease and albuminuria and enlargement of the spleen attend both Weil's disease and acute articular rheumatism.

#### THERMIC FEVER.

Martin<sup>3</sup><sub>Sept. 16</sub> makes three types of thermic fever: 1. A cerebro-spinal type, characterized by the symptoms of intense congestion;

by injection of the face and conjunctiva; by stertor, coma, and convulsions. 2. A cardiac or syncopal type, manifested by pallor of the face and by profuse sweats; death taking place by arrest of the heart. 3. A pulmonary form, in which, in addition to some of the symptoms noted, there are anxiety, dyspnoea, and asphyxia. As thermic fever usually arises under conditions of mental or physical overactivity in conjunction with undue exposure to heat and a suppression of the secretions, the disease is held to be dependent upon the retention in the system of toxic products of retrograde metamorphosis. Based upon this view, a rational mode of treatment suggests itself. During the heated term extraordinary exertion is to be avoided, especially when the exertion is associated with direct exposure to heat. The secretions should be actively maintained. Asphyxia is to be antagonized by subcutaneous injections of ether—from 15 to 30 minims (0.81 to 1.75 grammes) every hour—and by artificial respiration. In the congestive type of disease, cold affusions should be made to the face and head, and rubefaction of the extremities induced. Subsequently, to prevent the recurrence of congestion and asphyxia, to re-establish the functions of the natural emunctories, and to favor the elimination of noxious matters, subcutaneous injections of cocaine,—from 2 to 4 grains (0.13 to 0.26 gramme),—with or without ether, should be given three or four times in twenty-four hours.

Illoway<sup>9</sup><sub>Aug. 8</sub> has reported 3 cases of thermic fever in infants, each about 1 year old. The cases developed during the heated term, amid the most unfavorable surroundings. Each presented vomiting, diarrhoea, high temperature, and symptoms of profound depression. The cold wet-pack was used in treatment, with most successful results. Dercum<sup>112</sup><sub>June</sub> records 2 interesting cases presenting sequelæ of insolation. One occurred in a laborer, 31 years old, without history of alcoholic excess or of syphilis. While at work, in midsummer, he lost consciousness. For some five weeks he was delirious. During convalescence there was difficulty of speech and impaired motility and sensibility in the extremities. Subsequently there was some improvement in the symptoms: vertigo persisted; headache had disappeared; speech was still difficult, especially labial and dental articulation; the man could not whistle; there was slight drooping of the lower lip on the left side; there was wasting of the muscles of the shoulder, and fibrillar tremor of these and of the

biceps and triceps; if the arms were grasped below the elbow a coarse, purring thrill was felt; the muscles of the buttocks, of the thighs, and of the calves also presented fibrillar tremor; there was slight tremor of the lips and marked tremor of the tongue; there was persistent, dull, aching pain in the dorsal and lumbar regions; the knee-jerks were, perhaps, slightly subnormal; the muscles presented slight quantitative electric changes; the sphincters were competent; the hands and feet were cold and livid. Two applications of the white-hot cautery to the back were followed by a disappearance of the pain and by decided improvement in the symptoms. The second case occurred in a laborer 27 years old, without a history of syphilis or of alcoholism, who, while at work in the hot sun, lost consciousness. Subsequently headache, vertigo, weakness, and pain manifested themselves. The pain was referred to the course of the principal nerve-trunks. The muscles of the extremities were wasted; the deltoids and the muscles of the arms and forearms in highest degree. The atrophied muscles presented fibrillar contraction; a coarse, purring thrill could be detected in the muscles of the forearm; the extensors were everywhere most affected; there was a tendency to wrist-drop and to foot-drop; the lips and tongue were tremulous; there was slight drooping of the lower lip on the right side; the muscles of the right cheek and right upper lip were wasted; there was slight impairment of sensibility; the knee-jerks and the grasp were enfeebled; the electric reactions of the muscles were changed quantitatively except in the thenar and hypothenar muscles, which presented reactions of degenerations. In this case, too, decided improvement followed applications of the actual cautery.

Barlow <sup>53</sup><sub>June 6</sub> describes the sequelæ observed in a number of cases of insolation, many of which were in soldiers. In most of the cases both pulse and respiration were accelerated. Many presented indigestion, impaired nutrition, and anæmia. The majority complained of headache and vertigo. Perhaps the most constant feature was tenderness of the spine. The reflexes were, as a rule, exaggerated. In 4 cases, epilepsy appeared after the insolation; in 2, partial hemiplegia; in 9, cutaneous anæsthesia; in 3, hyperæsthesia. The mental faculties were impaired. In the majority, memory was enfeebled. One case presented marked muscular tremors; in 27, there was deafness. Twenty-six presented impair-

ment of vision. Sighing respiration was a not infrequent manifestation. In 14 cases the heart was irritable; in each of 15 a cardiac murmur was heard. In many of the cases the murmur was dependent upon the anæmia; in some it was organic. In some cases the heart was irregular or intermittent.

## PSILOSIS.

Begg<sup>2</sup><sub>Jan.31</sub> considers psilosis as not being a disease of the mucous membrane, but a result of interference with the function of absorption of the products of digestion, the lesions representing secondary processes. He<sup>486</sup><sub>Dec.15,'90</sub> believes the symptoms to be dependent upon the presence of an organism in the intestines, by the action of which the contents of the bowel are rendered unfit for absorption. In treatment he employs yellow santonin dissolved in olive-oil. Perfect rest in the recumbent posture is directed, and, in accordance with the percussion-note of the abdomen, treatment is begun with or without a dose of castor-oil, guarded by tincture of opium. An enema may also be given at bed-time. Hot fomentations are employed to relieve the painful flatulent distension. The diet consists principally of milk, with or without lime-water. It is important to take nourishment in small quantities at frequent intervals. Five grains (0.32 gramme) of santonin, in a teaspoonful of olive-oil, are give once daily, early in the morning or at bed-time, for six days. Caton,<sup>187</sup><sub>July</sub> of Liverpool, reported a case of psilosis, or Indian sprue, in a man, 48 years old, who had spent many years on the Chinese and Indian coasts.

## SLEEPING SICKNESS.

Mauthner<sup>57</sup><sub>June 7</sub> has called attention to the fact that so-called sleeping sickness presents all of the symptoms of chronic polioencephalitis. A characteristic manifestation of both is ptosis. The pathological lesion is likely to escape observation.

## GLAND FEVER.

Protassow<sup>366</sup><sub>B.32,H.4</sub> reports 4 cases of so-called gland fever. Pfeiffer<sup>366</sup><sub>May 10,'89</sub> describes as gland fever an infectious constitutional affection characterized by rapid growth and painful swelling of the cervical lymph-glands, with considerable elevation of temperature. He reports 4 cases. In children, the occipital glands are frequently

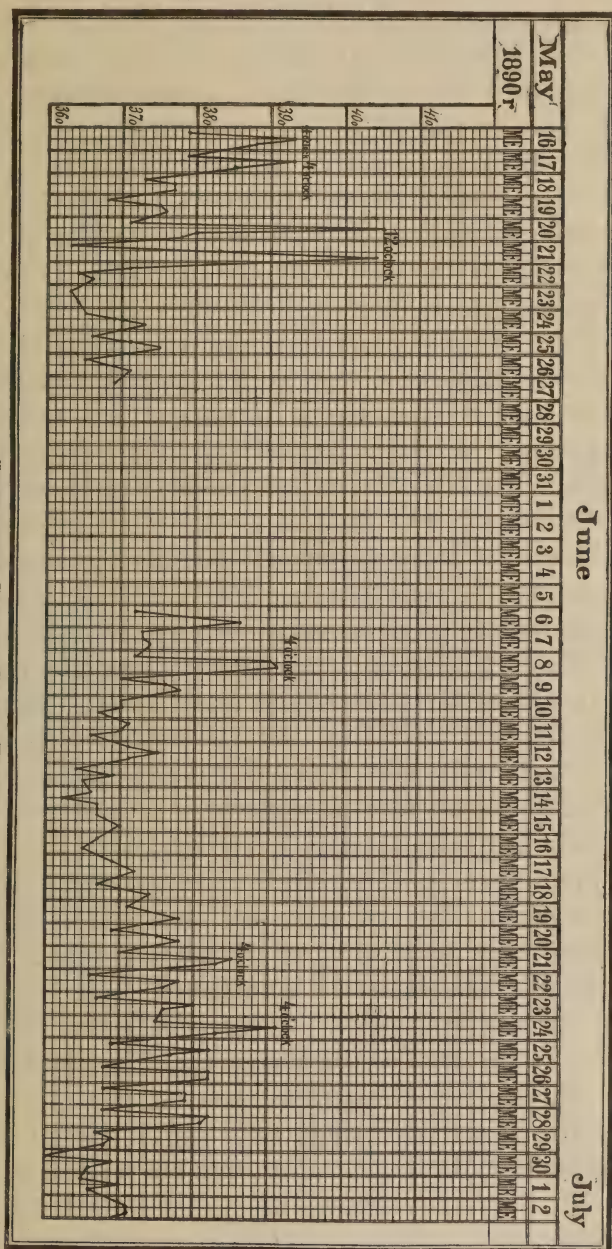


CHART IN A CASE OF GLAND FEVER.  
(Jahrbuch für Kinderheilkunde.)

enlarged, but not painful. The glands in front of the sterno-mastoid muscle also became enlarged, but without pain or other special feature. The chief characteristic is the rapidity with which

the swelling increases and the temperature rises, associated with a recession of the symptoms in the course of a few days or weeks. Heubner reports 4 cases. The first followed measles; the second and third were succeeded by acute nephritis; the fourth was accompanied by an urticarious exanthem. Rauchfuss<sup>366</sup><sub>B.31,p.461</sub> reports 2 cases, and maintains the distinction of the affection from the glandular enlargement associated with pharyngeal and nasal affections, and excludes the possibility of the existence of an abortive form of scarlatina. Filatow has described an acute idiopathic swelling of the lymph-glands at the upper margin of the sternomastoid muscle, especially between the auricle and the mastoid process and behind the angle of the lower jaw, associated with high temperature. Children between 2 and 4 years old and older are attacked. The affection is independent of local processes in adjacent structures. For the first week or ten days the disease pursues the course of an acute adenitis, then gradually to subside. Suppuration is uncommon. The condition is to be distinguished from parotiditis by its situation; by the firmly elastic consistence of the definitely circumscribed swelling; by its unilateral distribution, and by the protracted convalescence. Korsakoff<sup>530</sup><sub>No.22,'88</sub> describes a glandular swelling that develops after recovery from scarlatina and often precedes the advent of a nephritis. (See chart, page 75.) Protassow's first case occurred in a boy, 8½ years old, who complained of transient pain in the left knee-joint, and, on the following morning, of pain in the throat; at night, fever set in; sleep was restless. On the next day vomiting occurred. The cervical glands were noted to be enlarged and painful. Four times in the course of seven weeks the manifestations were repeated, but ultimately recovery took place. Inunctions of camphor ointment were applied to the swollen glands, and quinine tannate was administered internally. The second case occurred in a 5-year-old brother of the first. The third and fourth cases were in two brothers in another family, 4 and 9 years old respectively.

# SCARLET FEVER, MEASLES AND RÖTHELN.

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## SCARLET FEVER.

*Etiology.*—At a meeting of the Birmingham and Midland Branch of the Society of Medical Officers of Health, Bostock Hill <sup>July 18</sup><sup>2</sup> gave an interesting account of an outbreak of scarlet fever which occurred at Sutton Coldfield, in February, March, and April last. The outbreak was explosive in character, and the houses invaded had, almost without exception, the same milk-supply. The infection of the milk could not be traced to any human case of scarlet fever, nor was there any very definite sign of illness to be found among the cows at the dairy implicated. One of them, however,—a new arrival, which had recently calved,—was in poor condition, and Hill discovered some indications of recent ulceration on the teats. The sanitary authority declined to interfere beyond ordering disinfection and lime-washing. Late in March a number of fresh cases occurred, and, upon a second visit to the dairy on April 5th, Hill found that the suspected cow had become more emaciated, and had now extensive patches of desquamation. There was an ulcer on one teat, and also an eruption on the udder. A second cow presented slight indications of the same condition. Even at this stage the sanitary authority refused to adopt compulsory measures for stopping the sale of the milk. The dairyman produced the usual veterinary certificates that all the cows were healthy and in normal condition. Nevertheless, he consented to discontinue selling the milk, and, with the exception of one or two sporadic attacks, no further cases arose in that part of the borough. Unlike that of most recorded milk epidemics, the type was somewhat severe. Five out of the 40 attacks ended fatally, whereas

there had been no deaths among the 200 cases notified in Sutton during the two previous years. The age-incidence was also exceptional. Only 8 of the 40 sufferers were under 5 years of age, and 6 were over 20. Bostock Hill regards the outbreak as similar in character to that which occurred at Hendon in 1885.

*Diagnosis.*—A. Neumann<sup>326</sup><sub>Jan.</sub> states that there is much difference of opinion as to the frequency and diagnostic value of the scarlet-fever tongue. Some say it is very frequently seen, others that it is exceptional; some that it is characteristic, and others, again, that it is of little or no diagnostic significance. Neidhardt has described it as occurring frequently in other illnesses. The method followed by Neumann was to sketch the tongue as soon as the diagnosis of scarlet fever was made, and, after two or three days, to compare its condition with the sketch already made. This was done in 48 cases, the chief symptoms of the disease being noted at the same time. The mucous membrane of the tongue passed through three stages: (1) swelling and cloudiness of the epithelium; (2) desquamation; (3) regeneration of the lost epithelium. The first thing noted in the scarlet-fever tongue is a swelling of the entire mucous membrane, giving rise to longitudinal folds and channels, easily distinguished from the folds noted in bulbar paralysis by the consistency of the tongue. The cloudiness of the epithelium gives rise to the changed color of the tongue; it appears grayish white, white, or yellowish white,—that is, the tongue is coated. The back of the tongue is chiefly affected, the sides and tip being red. The desquamation does not take place as uniformly over the tongue as the other processes. It commences on the papillæ fungiformes. These latter appear as submiliary or miliary round, dusky-red dots, surrounded by a white area. Thus the tongue gets its strawberry appearance. In the third stage the sides of the tongue, and more particularly its tip, retain their red appearance and strawberry aspect longer than other parts of the tongue. The new epithelial layer may be so thick that the tongue appears coated anew. The swelling gradually goes away. The above is the usual course, but there may be departures from it.

In 2 cases the dulling of the epithelium was absent and the desquamation excessive, so that the longitudinal muscle-bundles were seen. In another case the epithelium was only detached in

part, and a new layer developed quickly, so that the tongue appeared coated throughout. It resembled a dyspeptic tongue. The author says that the fungiform papillæ appeared round and erect; whereas, in the dyspeptic tongue they are elongated and slope toward the tip of the tongue. Generally speaking, the digestive troubles cause the tongue to be coated before the scarlet-fever process has had time to affect it. If scarlet fever be combined with a septic condition, the latter determines the condition of the tongue. As the new infection appears early or late, so is the scarlet-fever process interrupted. Generally speaking, the tongue, after losing its epithelium, develops a strawberry appearance, and then becomes dry. Bleeding cracks may be seen, which can lead to deep ulceration, or true diphtheritic membrane may appear. Out of the 48 cases the tongue was typical in 38, in 4 cases one or two of the stages were only very slightly developed, and in 6 the typical scarlet-fever tongue was altogether absent. Of these 6, there was severe gastric disturbance in 2; another case was in a chlorotic girl; in the fourth case there were symptoms of septicæmia, and death on the fourth day; and in the fifth and sixth cases the tongue was quite unaltered. Thus, it would certainly appear that the scarlet-fever tongue is a tolerably frequent occurrence in the disease, and that, when absent, complication or previous illness has altered the tongue in other ways. The tongue recovers its normal state with the cessation of the fever. In the majority of cases the tongue had lost its epithelium and had become strawberry in three to five days. There is no proportionate relation between the intensity of the scarlet-fever poison as it affects the skin and tongue. Both processes are probably brought about in the same way, as their tolerably equal occurrence and their appearance much about the same time would suggest; and again, certain departures from the ordinary have shown a peculiar resemblance. Thus, in 1 case with a purpuric rash, the same was noted on the tongue; and in another, where syphilis was present as well, pustules were seen on the tongue as well as on the skin. This condition of tongue, though not always present, is observed in many cases. It is, however, of less value than it might be, as it does not appear before the fourth day or so, and it may certainly be present in other illnesses.

H. Gillet<sup>35</sup><sub>Jan. 7</sub> speaks of a fibrinous sore throat in scarlet fever, with white pseudo-membrane, not of diphtheritic origin. Appar-

ently, any inflammatory process in the throat, if the inflammation exceed certain limits, may exhibit the formation of pseudo-membranes. Now, according to classical teaching, there may occur in scarlatina two forms of membranous sore throat: one at the commencement,—innocent, limited; the other at the end,—very grave and extensive. It is with the diagnosis of the first condition that the present paper is concerned, for the physician is often most perplexed to distinguish this condition from true diphtheria. The differential diagnosis has been said to rest on the following points: 1. The scarlatinal membrane is *usually* confined to the tonsils, and almost invariably avoids the larynx, no such limitation being observed in diphtheria. 2. Temperature remains in the scarlatinal affection much higher than in diphtheria. 3. The adenitis which accompanies it often proceeds to suppuration; this latter point is only one of retrospective utility, as is also the absence of paralysis. 4. Bacteriologists lay stress on the fact that, in the pseudo-membranous condition, none but streptococci or staphylococci can be found, while in the true diphtheritic membrane the bacilli of Klebs and Loeffler can be detected. This is, however, a point which requires some skill and practice to determine. As regards prognosis, the non-diphtheritic nature of the disease will render this more favorable; but it must not be forgotten that the streptococcus, which seems the cause of this secondary affection, or which, at best, develops in the exudation, is analogous to that which produces erysipelas, puerperal infection, and suppuration. It must be remembered, too, that the condition of the throat often indicates that the scarlatina itself is of a particularly virulent kind.

*Complications.*—Dundas Grant<sup>157</sup><sub>Oct.</sub> gives statistics of the complications of 1008 cases of scarlet fever. In 69 of these there occurred a primary pyrexial adenitis, 17 suppurating; purulent rhinitis in 58 cases, frequently associated with otorrhœa; ulcerative stomatitis in 27 cases; secondary tonsillitis in 12 cases. In no case did diphtheria make its appearance.

Bourges<sup>2050</sup> considers the anginas which complicate scarlatina to be erythematous, pseudo-membranous, and gangrenous. He divides pseudo-membranous angina into early and late forms, for the two differ in etiology, pathogenesis, and prognosis, according as they appear at the beginning or only after the first week of the disease.

Early pseudo-membranous angina frequently appears to be unassociated with diphtheria, on account of its benignity, its failure to extend or to affect its general condition; but there is nothing in its objective characters which admits of an accurate discrimination from diphtheria. There are cases which are accompanied with pseudo-membranous coryza, croup, or parálýsis of the palate, which show all the characters of hypertoxic diphtheritic angina, but in which a diagnosis is impossible, without a bacteriological examination. Delayed pseudo-membranous angina is usually of diphtheritic character. As to evolution, the author distinguishes three varieties of precocious pseudo-membranous angina: the benign, which is characterized by membranes of not very great extent, by slight development of submaxillary adenopathy, and by absence of complications depending upon the angina; the grave, in which the false membranes extend rapidly, and are persistent,—the adenopathy, the fever, and the general symptoms are intense, and the duration is from nine to twenty-three days; the septic, in which there is a characteristic picture of hypertoxic angina. The author has studied 30 cases of angina bacteriologically. In 7 cases of erythematous angina a streptococcus was always found. In 5 cases he isolated a coccus, which he called coccus A; in 3 he found the bacterium coli commune, and in 2 the staphylococcus pyogenes albus. In 18 cases of precocious (early) pseudo-membranous angina the bacillus of Loeffler was found but once. In the other 17 he found a streptococcus; in 9 the staphylococcus pyogenes aureus; in 4 the bacterium coli commune; in 1 the coccus A; and in 1 the staphylococcus pyogenes albus. In 4 cases of delayed pseudo-membranous angina he found the bacillus of Loeffler three times. In the 1 case in which it was absent he found the streptococcus and the bacterium coli commune. The coccus in chains, which is so frequently found in the complications of scarlatina, is identical with the streptococcus pyogenes.

H. Gillet<sup>62</sup><sub>May</sub> relates a case of membranous angina commencing on the third day of a well-marked attack of scarlet fever; the false membrane, which was thin and whitish, covered the edges of the soft palate, the uvula, and the tonsils. The patient, aged 4½, died of asthenia on the sixth day. Cultivations were made during the life of the patient from the false membrane on the

palate, and pure colonies of the staphylococcus pyogenes albus were obtained; the diphtheria bacillus was not present. This negative result, Gillet points out, is important; and the positive result is also of value, since it shows that the staphylococcus pyogenes may be added to the list of micro-organisms capable of producing false membranes. Widal has shown that in some cases such membranes are due to the streptococcus pyogenes, and Gillet states that Jaccoud has recently found the pneumococcus almost pure in a false membrane on the tonsils and the pillars of the fauces. In this patient, a lad of 19, there was swelling of the cervical glands and albuminuria; so that—especially in the absence of any symptoms of scarlet fever—the resemblance to diphtheria was very close. These observations are of importance, both from the point of view of etiology and treatment.

Johnston<sup>282</sup><sub>Mar.</sub> exhibited before the Montreal Medico-Chirurgical Society for Armstrong specimens from a case of thrombosis of the superior longitudinal sinus and left renal vein following scarlatina. The patient, a female child aged  $2\frac{1}{2}$  years, had died, six weeks after the onset of an attack of scarlatina, with broncho-pneumonia. A large, firm, adherent, darkened thrombus completely filled the superior longitudinal sinus, and extended into the adjacent central veins. The brain was perfectly normal. The left renal vein and its principal branches also contained adherent red thrombi. The ovarian veins were not examined. The child had been delivered with forceps, and from within a fortnight of its birth it had suffered from convulsive seizures, which had occurred from once to six times a day. Various modes of treatment, including circumcision, had been tried without effect.

*Sequelæ.*—Hughes Reid Davies<sup>2</sup><sub>Feb. 23</sub> reports the following rare sequelæ of scarlatina: On the morning of November 10, 1890, F. S., aged 9 years, at the end of the third week of an attack of scarlatina, in the free, desquamation stage, awoke apparently in the best of health at 7 A.M., and was playing with his brothers and sister, all of whom were convalescing from the same disease. At 9.30 A.M. of the same day he ran crying to his mother, complaining of violent pain in his lower limbs, which were described as being “cold, puffy, and very tender to touch.” “Spots” then first appeared on the shins, both calves, and the dorsum of the left foot. The father and mother’s history was good, except for the following

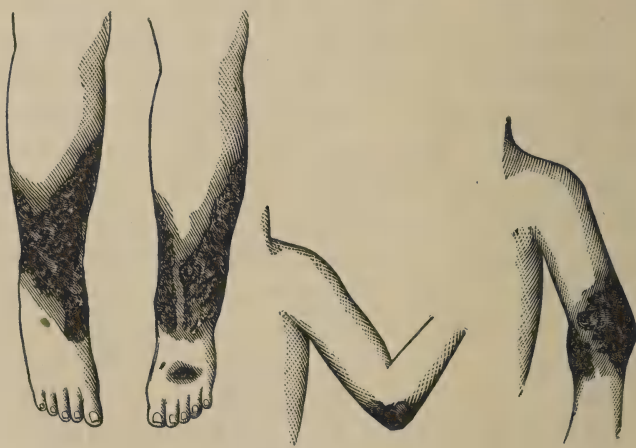
facts: The maternal grandfather died of small-pox and "bleeding" (hæmorrhagic small-pox?); "nose had to be plugged." The family on the maternal side bled easily. Two years ago, F. S. was attending at the Northeastern Hospital for Children, suffering from "general debility." He was always pale. He had measles and chicken-pox about four years ago. His nose used to bleed on the slightest provocation; general health at time of infection, good. Nothing worthy of note occurred during the course of scarlatina in any of the 6 children. F. S.'s attack seemed rather more severe than any of the others; the rash was well developed, lasted about six days, desquamation commencing almost immediately afterward.

At 1.30 P.M. on November 10th Davies saw the patient, and noted the following condition: He was anæmic, desquamating freely, clear-headed, chatty, and in capital spirits; temperature, bowels, and urine were normal; the pulse about 100, rather "irritable"; the lower extremities, from knees downward, were slightly œdematous; the surface was warm; there were ecchymoses about both ankles, generally scattered, but in some places merged; both calves were covered by bluish-black, subcutaneous, hæmorrhagic patches, surrounded by narrow zones of inflammation, and were very tender on touch. On the following day, November 11th, at 9.30 A.M. the patient was again seen, and sketches were made of the lower extremities and of the left elbow. The patient had passed a fairly restful night; the temperature was normal; the skin moist and very pale; the urine scanty, but normal; the pulse quicker, 120; the extremities were warm. The ecchymoses were now completely merged into patches of "raven-blue," surrounded by inflammatory zones; the symmetry of the patches was remarkable; the legs were slightly less œdematous, but still exceedingly painful, the child shrieking if they were moved or roughly handled. New centres of ecchymoses were appearing on the legs, and one of about the size of a five-shilling piece on the right hip from pressure. The appearance of new patches was always heralded by great pain; there was no enlargement of the joints. At 1 P.M. the patches were stationary, except those on the right hip and the dorsum of the left foot, which were spreading rapidly. A bruise-like ecchymosis had appeared on the point of the left elbow, which was very painful. There was no swelling of the joint proper, although it was moved with pain and great difficulty. The

patient was still very clear-headed, and took great interest in each new patch, which he exhibited for the writer's inspection on every



November 11, 9.30 A.M.



November 11, 9.30 A.M.

November 11, 1 P.M.

November 11, 4.30 P.M.

RARE SEQUELÆ OF SCARLATINA.  
(*British Medical Journal.*)

visit. The limbs were warm; there were no feverish symptoms. At 4.30 P.M. the patches were spreading rapidly, and there was considerable swelling of the left elbow-joint, with marked purpuric

discoloration. The joint could not be moved, actively or passively, without intense pain. Slight feverish symptoms were developing; the pulse was about 140.

At 7.30 P.M. the patient was removed, with every care, to Homerton Fever Hospital. The father informed me that removal had been borne capitally, and that the child was quite clear-headed and in good spirits. He also stated that the patches were still spreading, new centres forming in other parts, and that swelling of one ear had been noticed. The patient died on November 12th, about noon. A post-mortem examination was made at 12 M., November 14th, forty-eight hours after death. Blood-stained fluid was found in each pleural cavity, more being in the right. Lungs anæmic, otherwise normal. Heart contained no clots; walls somewhat thin and flabby. Liver and kidneys anæmic. Spleen not enlarged. Intestines very anæmic, walls very thin, contained a little fæculent matter. Bladder contained only a few drops of urine. No fluid in peritoneal cavity. No extravasations of blood in any internal organ, and no abnormality except anæmia. Mouth and throat examined; tonsils congested in patches. Brain removed and examined; arachnoid milky, convolutions somewhat flattened, small quantity of serum in ventricles; nothing further detected.

*Concurrent Scarlet Fever and Measles.*—N. Morris MacFarlane<sup>6</sup><sub>May 16</sub> reports the following 3 cases of concurrent scarlatina and measles occurring in the same family: J. S., aged  $4\frac{1}{2}$  years, was suddenly taken ill at school on December 5th, and sent home. When seen the next day the sickness had abated, but his temperature was  $104^{\circ}$  F. ( $40^{\circ}$  C.); pulse, 130; skin dry and pungent; tongue covered with a white fur, and he complained of headache and sore throat; no rash visible. Next day the characteristic rash of scarlet fever made its appearance, and increased in intensity till the following day, when the skin presented an almost uniform blush. On the evening of the 8th he commenced to cough, and there was coryza and suffusion of the eyes. On the 10th the rash began to fade, but on the following day the skin presented an unusual appearance. The red points of the scarlatinal rash were still visible, but there was likewise a purple papular eruption, which presented all the characters of that of measles. On the 15th the scarlatinal rash had vanished, but that of the measles persisted for several days after desquamation had com-

menced. Beyond a slight swelling of the glands of the neck and suppuration of the right middle ear, which retarded convalescence for a short time, he made a good recovery. A younger brother, aged 3 years, was taken ill on the 23d with vomiting, sore throat, and pain in the head, and on the 25th there was a well-marked scarlatinal rash, which was followed in three days by that of measles. He progressed favorably till the 31st, when the glands of the neck and under the jaw became much swollen. The throat and mucous membrane of the nose became greatly inflamed, and showed patches of false membrane. He gradually got worse, convulsions supervened, and he died on January 4th. A younger brother, aged 1½ years, was seized in the same way as the other two on December 27th. The scarlatina came first, followed in four days by the measles. Both ran their course without any untoward symptom, and he was progressing favorably until January 12th, when his neck became much swollen and inflamed. Suppuration and sloughing ensued, and he died exhausted on January 19th.

*Concurrent Varicella and Scarlet Fever.*—At a meeting of the Société Médicale des Hôpitaux, June 19th, Galliard<sup>673 Aug.</sup> reported the following case: A child 17 months old, whose brother had had varicella on March 4th, was found on March 21st to have the typical eruption of varicella. The next day there appeared a scarlatinous rash, which was found on the neck, chest, abdomen, and flexor surfaces of the joints. The throat was normal; the child was not taking any medicine. The following day the fever disappeared and with it the rash; the vesicles dried up, and there were no further phenomena. Thus, the general character of this rash has been to appear after the vesicles of the varicella, and to interrupt, so to speak, the evolution of the disease. These are two conditions which have not been found in 9 cases previously reported; in the latter the rash preceded the typical eruption. Generally, this exanthem has no prognostic significance; in 1 case it was followed by gangrenous varicella. Hensch had 1 case in which the rash was present.

*Treatment.*—N. S. Manning, of the Birmingham City Hospital,<sup>2 May</sup> has used the following method of treatment in the ulcerated throats of scarlet fever and diphtheria for the past two years and a half: The appliances necessary are a small India-rubber-bag

syringe,—4 or 6 ounces (120 or 180 grammes), according to the size of the patient,—two small basins, and a towel. The medication used is boric acid dissolved in hot water (about 105° F.—40.6° C.). In order to facilitate the solution of the boric acid, the author has a saturated solution in glycerin, of which the following are the proportions: pulv. acidi boric., 4 parts; glycerin (sp. gr. 1260), 3 parts. The glycerin should be heated by steam, and the boric acid—best quality, carefully powdered—stirred in till the solution is perfect. Of this solution a large tablespoonful is dissolved in about a pint of hot water. The method of procedure is as follows: Place the patient sitting up, or, if too weak to sit up, place him on his side with his face over the end of the pillow; apply the towel round his neck, to keep him dry if any water accidentally gets spilled. Withdraw the nozzle from the syringe before filling it, and fill with the solution; replace the nozzle, and direct the patient to open his mouth; then put it into the mouth, well over the back of the tongue, and forcibly empty the syringe, at the same time receiving the water which rushes out of the mouth and nose into the empty basin. In this way the mouth, fauces, pharynx, and in some cases the posterior and anterior nares, are irrigated; the operation is repeated till the parts are quite clean. In cases of purulent discharge from the nose, or nasal diphtheria, the same procedure is applied to the nostrils; the irrigation may be performed every two or four hours, as circumstances require. In this hospital, during two years, over 1500 cases of ulcerated scarlet fever and diphtheritic throats have been treated by this method. From this experience the writer can recommend it as superior to any other he has ever tried. He believes its efficacy is due to the fact that it is founded on the rational principle of washing away all septic discharges with a non-irritating, non-poisonous fluid. It is not in any way disagreeable to patients; on the contrary, when the mouth is dry or foul, it is most comforting. The solution is rendered sweet by the glycerin, so that only a small percentage of even very young children offer any objection to it. Occasionally children swallow some, but without any subsequent ill effects. It should be borne in mind that, in order to prevent any septic matters being sucked into the syringe, the nozzle should always be withdrawn when filling.

Jacoutini, <sup>67</sup><sub>Feb. 28</sub> in a severe epidemic of scarlatina, tried the effect

of hypodermatic injections of sublimate. He gave it in doses of 0.01 gramme ( $\frac{2}{13}$  grain) for eight or nine days. Under this treatment the fever diminished rapidly and the throat troubles disappeared. Encouraged by these results, he applied the same treatment to 2 severe cases of diphtheria, with equal success. The number of cases quoted and the details given are too meagre to allow of any conclusions being formed as to the real value of the method. In the severe forms of throat and glandular affections Dundas Grant<sup>157</sup><sub>Oct.</sub> advocates washing out the throat with chlorine or boracic-acid solution and applying fomentations.

W. Allan Jamieson<sup>6</sup><sub>Sept. 12</sub> gives the following method of accelerating desquamation, and, therefore, of shortening the infective period: Mild measures of disinfection, repeated at frequent intervals throughout, are much more certain and satisfactory than stronger ones employed solely toward the close of the process of skinning, or just before permitting a return to free intercourse and association with all and sundry. Carbolic acid, in the proportion of 3 per cent., in ointment or oil, constitutes the most reliable agent. With this, however, should be combined daily ablution with soap and warm water, so as to remove, as rapidly and as completely as possible, the dry, epidermic particles as soon as these become loose, the carbolized oil or ointment being rubbed on the surface after it is dried. Further experience has convinced the writer more firmly of the truth of these principles. Such measures alone render isolation, where that can be carried out, effectual; even without isolation, when such cannot be obtained, they reduce to a minimum the risk of infecting others. While this method, therefore, affords the maximum of protection, it occurred to the author that it might be possible safely to accelerate desquamation itself, so as to lessen the period during which infection is likely to take place. Various modes of attaining this end were tried in succession, and were rejected as unsatisfactory; but, eventually, a plan was discovered which is at once simple and effectual, and which, so far, has not been proved to have any disadvantages. The action of resorcin in causing the outer layers of the epidermis to separate without injury to the deeper ones is now well known, and has been made use of in the treatment of ichthyosis and of acne. Rubbed on as an ointment, it did not produce the desired effect in scarlet fever. A resorcin soap, indeed, would have amply fulfilled the indications,

but on inquiry it was found that there were chemical difficulties in the way of manufacturing such. When resorcin was incorporated with ordinary hard or soft soap a molecular change took place in the drug; its constituents broke up, and formed new combinations; in fact, it was no longer a resorcin soap. But in process of time, by a simple procedure, Eichhoff succeeded in obtaining a stable resorcin soap. He found that, when a soap was made chemically acid by the addition of salicylic acid, a moderate amount of resorcin, quite sufficient for the purpose, could be combined with it. A 3-per-cent. resorcin salicylic super-fatted soap is now prepared by Beiersdorf, of Hamburg, and by Muhlen, of Cologne. When this soap is used to wash cases of scarlet fever, warm water being always employed from the commencement to the close of desquamation, a notable diminution of the period occupied by "peeling" is observed.

From the consideration of a large number of unselected cases, the conclusion has been arrived at that, while the commencement of desquamation may be as early as the fourth day of the disease, or may, in exceptional instances, be delayed as late even as the sixteenth, the average day on which it is first visible is the ninth. Again, Jamieson determined that, from the onset of the disease till the completion of desquamation in 62 unselected cases, the average was 55.5 days, no treatment having been employed to interfere with the natural process. But when washing with the resorcin salicylic soap was begun as soon as signs of desquamation could be noticed, or shortly before, the desquamation was entirely completed in from 40 to 26 days. There is thus a gain on the average of more than a fortnight. In 2 cases washing with the soap was practiced on only one side of the body, a commencement being made in one three, in the other four days prior to the appearance of any trace of scaling. In the case in which the right side was washed peeling began on the right palm, and then subsequently on the right side of the trunk and limbs; in that in which the left side was so treated the left palm, then the left side of the trunk and limbs, showed the earliest indications of desquamation. In all cases it was found advantageous, after washing with the soap and drying the body, to smear on a small quantity of some bland oil, such as olive-, almond-, or purified whale-oil. The nurses, too, found it necessary to protect their hands with India-rubber gloves,

or to use a sponge carefully in washing the patients, else their palms became tender from a thinning of the epidermis.

*Carbolic-Acid Poisoning from the Use of Inunctions of Carbolyzed Oil in Scarlatina.*—F. P. Atkinson<sup>6</sup><sub>June 18</sub> reports a case of carbolic-acid poisoning from the use of inunctions of carbolyzed oil. He was astonished at the early and extensive peeling which occurred, and could scarcely make out the cause, till one day he noticed that the patient was listless, with dry, brownish tongue, and, on examination, the urine was found to be smoky. Upon questioning the nurse, he found that she had been using the ordinary carbolyzed oil (1 in 40), and therefore he immediately ordered it to be stopped and plain oil, for the time being, to be used instead. The symptoms quickly abated, and the patient made a rapid recovery.

#### MEASLES.

*Etiology.*—Bard<sup>443</sup><sub>May 20</sub> formulates the following conclusions bearing on the incubation and contagiousness of measles: 1. The germ of rubeola does not remain in a locality from which those who have suffered with the disease have gone away. The author has never seen a healthy child contract the disease from being in a room in which a sick person might have been only a few hours previously. Hence, disinfection of the bed and furniture is unnecessary. 2. Contagion is always direct, in an epidemic of this disease, from person to person, though the author admits, with Sevestre, that it passes through the intervening air. 3. Incubation is shorter in the intense than in the mild forms; but it is prolonged in cases which are benign and in feeble persons, whether from natural tendency or as the result of other sickness. It usually lasts from twelve to eighteen days, but may last twenty-one days. 4. The power of the contagion is such that in a favorable medium it attacks all who are susceptible to it. Hence, when a school is closed on account of an epidemic, it is usually too late to be of benefit to those who have been attending the school. 5. Contagion is possible three or four days before an eruption is evident. 6. Broncho-pneumonia is a secondary additional infection, but may co-exist with the rubeola and manifest a mixed infection. The symptoms of the lung disease disappear early.

H. Méry and P. Boulloche,<sup>118</sup><sub>Apr.</sub> after bacteriological studies on the saliva of children suffering from measles, believe that the

pneumococcus and streptococcus are met with in the saliva of children suffering from measles with much greater frequency than is the case in health. Broncho-pulmonary complications in the course of measles only occur, with but rare exceptions, in children in whom the saliva contains the pneumococcus and streptococcus. At the autopsy, in fatal cases, it is possible to follow the pathogenic microbes recognized in the saliva throughout the upper air-passages down to the finer bronchi. The frequent presence of the pathogenic microbe in children suffering from measles serves to explain the great frequency of broncho-pulmonary inflammations in such cases. The practical deduction is, therefore, that during the progress of a case of measles the most rigorous attention should be paid to buccal antisepsis.

*Incubation.*—H. Gillet<sup>62</sup><sub>Aug.</sub> relates several cases in support of the view that the true period of incubation of measles is from eight to nine days, followed by a period of invasion lasting from four to five days; so that the interval between infection and the eruption is from thirteen to fourteen days. In 1 of the cases the exposure to infection was for a limited part of a day only, and in this case the period of incubation was eight days, and the eruption appeared in the night between the thirteenth and fourteenth days. Gillet considers that any departure from these periods is rare, and the difference never great; he admits, however, the possibility of a period of nineteen days from infection to rash, but points out that, even so, a period of isolation of fifteen days would be sufficient to ascertain whether a child who had been exposed to infection would develop the disease, since the period of invasion is never less than four or five days, and, therefore, even in cases of delayed development of the disease, the symptoms of invasion would be noticeable on the fifteenth day at the latest.

*Symptomatology.*—J. B. Harris<sup>6</sup><sub>Feb. 21</sub> reports the following case of measles with obscure symptoms: On February 3d he was called to see a lad who had been suffering from diarrhœa for ten days. He found, on his arrival, that the motions were reduced in number to three in the twenty-four hours. These were described as simply colored water, and were discharged with great force. The boy was in bed, looking extremely ill, but in no pain, and said he felt "all right." The temperature was 102° F. (38.9° C.);

the tongue was covered with a white fur; the abdomen exceedingly distended and tympanitic. On pressure, gurgling was produced everywhere except in the right iliac fossa. The pressure did not cause any pain. The next day he was much worse; abdomen still more distended. The gurgling now occurred at intervals without pressure, and was so loud at times that it quite startled the nurse; when this happened the child felt pain, but none on pressure. The temperature was  $104.4^{\circ}$  F. ( $40.2^{\circ}$  C.) and there was well-marked opisthotonos. In the evening G. F. Barnes saw the case with the writer. As they could not obtain any evidence of the patient having had a proper motion for over ten days, only what was described to them as "water," the question was discussed as to whether it was a case of partial intussusception; but there had been no vomiting, no passing of mucus or blood. Examination per rectum revealed nothing. They were, therefore, bound to make the unsatisfactory report to the parents that the child was in a most critical state, but that the cause of the dangerous symptoms they were at present unable to discover. Early on the following morning the writer received a telegram: "Harold has a rash." He found, on his arrival, the patient much better. Temperature,  $103^{\circ}$  F. ( $39.5^{\circ}$  C.); abdomen smaller; no opisthotonos; but he undoubtedly had measles. The next day the temperature was only  $101^{\circ}$  F. ( $38.3^{\circ}$  C.), and on the following normal. All catarrhal symptoms had been absent.

*Complications.*—A paper by J. H. Hutchinson<sup>2</sup><sub>Apr. 18</sub> was read by W. B. Cheadle before the Royal Medical and Chirurgical Society of London. In it the author called attention to the rarity of the occurrence of endocarditis as a direct result of measles. He recorded 4 cases of endocarditis, all of which occurred in an epidemic of measles at a boys' school. Case I: Boy aged 10, with a rheumatic family history, developed mitral murmurs on the second day of the prodromal stage. Case II: Boy aged 9 suffered from measles, complicated with catarrhal croup and slight bronchopneumonia; a mitral systolic murmur was heard on the fifteenth day. Case III: Boy aged 9, several of whose relatives had suffered from heart disease, probably rheumatic, developed bronchopneumonia and pleurisy on the second day of the eruption of measles, and endocarditis on the fourth day. Case IV: Boy aged 11, having had repeated attacks of follicular tonsillitis, but no

articular rheumatism, whilst apparently convalescing from a rather severe attack of measles, developed a systolic mitral murmur on the fourteenth day. The author suggested that a rheumatic taint might have been a predisposing cause, since the first case had rheumatic history and had suffered from chorea, the third had family history of heart disease, and the fourth had follicular tonsillitis. Cheadle said that very probably the poison of measles could act on the endocardium just as it did on the mucous membranes or on the meninges. It was possible that some of the cases of heart disease hitherto regarded as unexplainable might be due to this cause. He had not seen a case during life, but he had found reference to 2 in the post-mortem records of the Great Ormond Street Children's Hospital. He wondered if some of the cases might not be severe r  theln, which often had grave complications. Sturges feared the author had drawn his conclusions from an insufficient number of cases. He doubted if endocarditis followed measles, and it was very difficult from the physical signs to say that endocarditis was present. Lee had never been able to satisfy himself that a single case of valvular cardiac disease was due to measles, though the older writers held that small-pox, measles, and scarlatina were all causes of endocarditis. Haig supported the writer in his contention that more cases of endocarditis would be found in the course of measles if they were looked for. He had elsewhere maintained that endocarditis was due to the action of uric acid on the fibrous tissues of the heart, and this was more likely to happen if, as in the second and third cases, the fever of measles was accompanied by an inflammation like that of broncho-pneumonia. He held that the murmur in the last case was probably due to cardiac dilatation.

Samuel W. Kelley<sup>80</sup><sub>Jan.</sub> reports a case of subcutaneous emphysema complicating measles. The patient, a boy of 3½ years, was like an air-cushion over the neck, body, and upper extremities. The most remarkable thing about the case was, that it came on in the absence of any violent cough or any known injury, such as a fall or sudden blow upon the thorax. He had only a slight bronchial catarrh, which would have passed entirely unnoticed but for the advent of this phenomenal emphysema. The child was given a sedative cough mixture, and the extremities, body, and neck were comfortably bandaged. He recovered in a few days.

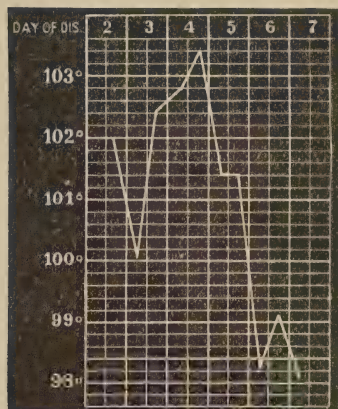
*An Anomalous Case of Measles.*—J. C. Wilson<sup>19</sup><sub>Jan. 17</sub> reports the following case, which illustrates two points of importance in regard to the acute infectious diseases, viz., (1) variation from the ordinary type; (2) the difficulty of diagnosis in atypical cases:—

*Atypical Measles; Sudden Onset; Absence of Coryza; Erythematous Sore Throat; Scarlatiniform Eruption.*—G. S. J., aged 16, a school-boy, had suffered from r  theln some years ago. He had never had measles or scarlet fever, and was peculiarly liable to attacks of sore throat. He had mild enteric fever in September, 1890; made a good recovery, and was in his usual health. November 27th, upon rising, he felt chilly. The chilliness and shivering continued throughout the day. Toward evening his throat became sore. There was no sneezing, no coryza, and no cough. November 28th, the boy was feverish and indisposed, and had what he described as a severe attack of indigestion, but without vomiting. He had no appetite, a good deal of pain on swallowing, and pains in back and joints. His evening temperature was 102   F. (38.9   C.). November 29th, he had a brilliant erythematous inflammation of the soft palate, uvula, half-arches, and tonsils. His tongue was thickly coated with a yellowish-white fur, and his bowels were constipated. His urine was non-albuminous. He complained of throbbing headache and backache; the pains in the joints had disappeared. His face was slightly flushed, but free from eruption; his eyes were suffused, but not intolerant of light. There was still no sneezing; no cough; no r  les. Upon examination the neck, thorax, and sides of the abdomen were seen to be covered with a diffuse erythematous exanthem resembling that of scarlet fever. The back and extremities were free from rash. The pulse was 112; the temperature, 100   F. (37.8   C.). The evening temperature was 102.4   F. (39.1   C.). The boy was now given hydrarg. chlorid. mitis, 5 grains (0.32 gramme); pulv. morph. comp. (Tully's powder), 2 grains (0.13 gramme); every two hours. November 30th, the throat was less painful, but still deeply red; there was no eruption over the mucous membrane covering the hard palate. The diffuse scarlatiniform eruption had extended over the face, trunk, upper extremities, and lower extremities as far as the knees. Upon the legs and arms it was most conspicuous upon the extensor surfaces, but it also covered the flexor surfaces. When viewed at a short distance it preserved its uniform appear-

ance. Upon closer examination it seemed to be punctiform, and the hair-follicles were seen to be especially swollen and congested. The texture of the patient's skin was rather coarse. There was also, on this day, some irritative cough; but, upon auscultation, no râles were discovered. The morning temperature was  $102.4^{\circ}$  F. ( $39.1^{\circ}$  C.); the evening temperature was  $103.4^{\circ}$  F. ( $39.7^{\circ}$  C.). The use of the calomel was followed by two large movements of the bowels. The patient was now given:—

R Chloral hydratis, . . . . . 3 grains (0.19 gramme).  
 Syr. lactucarii (Aubergier's), . . 15 minims (1.02 grammes).  
 Aquæ, . . . . . 45 minims (2.80 grammes).  
 Sig.: Every two hours.

December 1st, the throat was much better, and the cough no longer troublesome. Upon the face, chest, and extensor surface of the extremities the rash preserved its former appearance; on the flexor surface of the forearms the diffuse rash had disappeared, leaving the dull, red, occasionally discreet, flat, papular eruption of measles, with characteristic curvilinear and crescentic arrangement. The exanthem of measles showed itself on this day upon the legs below the knee. The morning and evening temperature was  $101.4^{\circ}$  F. ( $38.5^{\circ}$  C.). December 2d, the morning temperature was normal; the throat was well; the exanthem was everywhere rapidly fading. December 6th, convalescence was fully established, and there was a fine, scaly, desquamation of face and neck; the temperature was normal, the urine not albuminous. December 12th, a brother of the patient, aged 11, who had been sent to the house of a relation, was brought to Wilson on account of a troublesome irritative cough and sneezing, which had lasted two days. The following day he developed the eruption of measles. This case, trivial as it appears when thus set forth, is not without practical interest. During the first three days a correct diagnosis was practically impossible. It was only upon the fourth day, when the fading erythema brought into relief



RARE CASE OF MEASLES.  
 (Medical and Surgical Reporter.)

the exanthem of measles on the flexor surface of the forearm, and when the same eruption appeared upon the legs below the knees, that a doubt arose.

The subsequent history of the case renders the diagnosis of measles alone tenable. The abrupt onset, with shivering and erythematous sore throat; the site of the appearances of the rash and the mode of its distribution; the absence of coryza; the insignificant catarrhal symptoms; and the temperature range, taken altogether, constitute in this case a wide variation from measles in its ordinary form. The practical bearing of such a departure from type in any of the exanthematous diseases especially occurring in private practice requires no comment.

*Concurrent Measles and Scarlet Fever.*—C. H. Phillips<sup>2</sup><sub>Dec. 20, '90</sub> reports the following case of co-existence of measles and scarlatina: He was called to see a child, E. M., aged 4 years, on October 20th. He had not been complaining for two days. The writer found the usual symptoms of scarlatina: sore throat, temperature 103° F. (39.5° C.), strawberry tongue, and a well-developed scarlatinal rash. The child was removed on October 21st to the Hospital for Infectious Diseases, where Phillips was in charge. On October 24th a sister of the child, named S. E. M., aged 13 years, was taken ill. Phillips was summoned, and found her in the same condition. In both cases the rash was well developed. This child was also removed to the hospital. The first child lost the rash on October 26th, but Phillips noticed that he was not well. Symptoms of coryza developed, with a great amount of sneezing and slight cough. A hot bath, among other remedies, was ordered, and the following day the child had a well-developed rash of measles all over the body. As no other cases of measles had been in the hospital before, it was isolated in a separate ward, and no other cases appeared. The child, although only 4 years old, had been attending an elementary school, where, upon inquiry, the author found that 100 children out of 270 were detained at home in consequence of both measles and scarlatina.

Phillips believes that the germs of the latter disease must have been in the system of the child at the time that it developed scarlatina. As the period of incubation of measles is fourteen days and scarlatina two or three days, this would give the time exactly.

## RÖTHELN.

N. S. Manning, Medical Superintendent of the City Fever Hospital, Birmingham, <sup>22</sup><sub>Feb. 18</sub> reports the following outbreak of 38 cases of rötheln. The infection was twice imported into the hospital,—first in March, 1890, and, secondly, in June. Out of the 38 cases under observation 20 cases occurred in the spring outbreak and 18 in the summer. Twenty-four of the cases were females and 14 males; 22 were under three years, 14 between three and six, and 1 nine, and 1 twelve. The age given in some books is five to fifteen years. No micrococcus or germ, so far as Manning knows, has been described; but with regard to the transmission of the infection from one individual to another, this undoubtedly takes place early in the disease, probably before any visible symptoms develop. On the occurrence of the earliest symptoms, all cases were at once removed from the ward and isolated; every precaution was taken to disinfect the bedding, etc., and still other cases occurred. There was no case where the infection was carried from one ward to another by attendants. The length of the incubation period is said to vary from one to three weeks. The two outbreaks under notice occurred in 12 well-marked series, *i.e.*, from the removal of one series of cases from a ward until the occurrence of the next, in which the incubation period extended from ten to twenty-three days, and only in one instance was the latter period noted. In the majority of cases the eruption appeared at the end of the second week or the beginning of the third.

The stage of invasion (as properly understood from the development of the first symptoms till the appearance of the rash) is so short that it is practically absent, and this is a most important point in the differential diagnosis between rötheln and measles. Of the 38 cases, in 6 only were invasion symptoms noticed; of these, 3 had slight rise of temperature, with redness of the conjunctiva, and cough for one day; 2 had cough and coryza for three days, with evening temperature of 103° F. (39.5° C.), while the sixth had diphtheritic sore throat, with severe constitutional disturbance, six days before the rash appeared. In most cases the rash was noticed while the child was being dressed or undressed, and in some instances while sitting at meals. Any invasion symptoms must have been so slight that they escaped detection. The

eruption appeared, in every case, upon the face and chest as pink, rose-colored spots, seen under the cuticle. In twelve or twenty-four hours these spots increased greatly in size, pushed up the cuticle in a flat, non-papular form, and with a velvety-soft feel to the touch. During this time numerous new maculæ appeared over the trunk and limbs. In forty-eight hours the eruption had greatly increased, in many cases became confluent on the face, the features becoming slightly swollen. In 3 cases the eruption began to fade at this stage. On the third day the eruption spread on the body and limbs, the spots coalesced, and formed large, irregular, erythematous patches or blotches of irregular shape. There was not that uniformity of distribution usually seen in measles. The eruption then usually became darker in color and began to fade, but on the fourth day, in some cases, it became more diffuse or general. In 10 cases it could scarcely be distinguished from scarlet fever; but on careful examination, as a rule, small spots or streaks of normal skin could be seen about the back or buttocks, surrounded by an intense erythematous blush. Phillips has never seen similar spots in what one might term a well-developed scarlet-fever rash. As a rule, the rash began to fade on the third or fourth day, but in a few cases it remained longer. On a few occasions he noticed that the rash became paler about the second day, and again reappeared. The decline of the rash was always gradual, and in the order that it appeared. In 8 cases there was dark staining left for several days, which, as it faded, had a tendency to assume a brownish and yellow appearance, and in 3 it amounted to dark petechiæ, which did not disappear on pressure. In 1 there were large hæmorrhagic extravasations, about the size of a shilling, on the abdomen and back. These lasted for twelve days, and during the process of absorption presented the characteristic color-changes of a bruise.

The temperature in all rose *pari passu* with the development of the rash. In some it ran up quickly to 104° F. (40° C.). The temperature fell as the eruption faded, except where complications intervened. In 15 cases the highest temperatures registered were 104° to 106 $\frac{2}{5}$ ° F. (40° to 41.1° C.); in 6 others the highest temperatures were 103° to 103 $\frac{1}{2}$ ° F. (39.5° to 39.8° C.), and in the remainder of the cases it varied from 100° to 103° F. (37.8° to 39.5° C.). The nervous disturbances which usually attend

these high temperatures—such as sleeplessness, restlessness, etc.—were always present, and in 2 cases there was delirium.

The heart's action was rapid in many cases, registering from 140 to 170 beats per minute. A constant and important sign was the enlargement of the superficial lymphatic glands, posterior to sterno-mastoid muscle in the neck, in the axilla, and groins. These were enlarged in every case. They felt like small horse-beans under the skin, were not painful, but were slightly tender to the touch. In only 3 cases was there marked coryza. Troublesome, barking cough was a frequent symptom, and appeared to be due to laryngeal catarrh. Acute laryngitis (not diphtheritic) occurred 6 times; this is a very grave and fatal complication. Four or 5 deaths were due to this cause, in conjunction with broncho-pneumonia; 15 cases were complicated with bronchitis, and 10 with broncho-pneumonia. Desquamation was noted in only 3 cases. The great thirst and loss of appetite which accompanies pyrexia were always present. The tongue was more or less coated with whitish fur, which disappeared as the attack subsided. In a few cases the tongue stripped, leaving a raw, red surface, with enlarged papillæ, much resembling the *strawberry tongue* of scarlet fever. Stomatitis occurred 8 times, with extensive ulceration of the gums, buccal mucous membrane, and tongue. Vomiting occurred in the invasion stage only once. Diarrhœa occurred 3 times about the end of the first week. Nephritis occurred once, but may have been due to scarlet fever. Several cases had otorrhœa previous to the attack, and 5 developed it subsequently. Varicella occurred in 2 cases concurrently with the rötheln, both eruptions being out at the same time. Previous to the rötheln all the cases had scarlet fever, but in addition 3 had pertussis, 2 varicella, and 1 diphtheria. Five cases were fatal,—4 from laryngitis and broncho-pneumonia and 1 from diphtheria. The mortality in the 38 cases was 13.2 per cent.

In conclusion, the author sums up the most salient features by which we may distinguish this disease from measles and scarlet fever. To come to a correct diagnosis in an isolated case of rötheln is no easy matter; it has so many characteristics in common with the two diseases mentioned, more especially measles. It is impossible to find any one point which will clear up the difficulty; but one must rather take whole groups of signs and symptoms on which to form an opinion:—

	Rötheln.	Measles.	Scarlet Fever.
<i>Invasion</i> . . . . .	<i>Nil.</i>	Three to five days, with pyrexia and conjunctival and bronchial catarrh.	Twelve to twenty-four hours, pyrexia, headache, and vomiting.
<i>Catarrh</i> . . . . .	Slight or absent.	Marked conjunctivitis, coryza, cough, etc.	Absent.
<i>Eruption</i> . . . . .	Appears on face and chest as bright, pink-red maculæ, first under the cuticle, which become raised, with tendency to spread and form irregular patches or become diffuse.	Appears on face as darkish-red, slightly-raised papules; extends to trunk and limbs; papules become confluent, but distribution is more uniform.	Appears on chest as diffuse general redness of skin.
<i>Throat-lesions</i> . . . . .	Slight swelling and injection of fauces.	Fauces injected.	All the faucial structures acutely inflamed, swollen, and red, or ulcerated.
<i>Tongue</i> . . . . .	Furred.	Furred.	Thickly furred, which begins to strip off in twenty-four or forty-eight hours, leaving raw surface, with enlarged papillæ.
<i>Superficial lymphatic glands</i> . . . . .	Always enlarged in axillæ, groins, and behind sterno-mastoid muscle in neck.	May be enlarged at angles of jaw and behind sterno-mastoid muscle.	May be enlarged at angles of jaw and behind sterno-mastoid muscle.
<i>Desquamation</i> . . . . .	Absent, or very slight.	Branny.	Characteristic peeling off of large pieces of epithelium.

Gumpłowicz<sup>366</sup><sub>B.27,H.3</sub> states that he found the following points of distinction of this disease from ordinary measles: 1. The prodromal stage was short or altogether absent. 2. The exanthema had a more rosy appearance. It showed a characteristic network formation upon the body and extremities, while the face, the eyelids, the lips, and the nose were frequently uninvolved. 3. The appearance, efflorescence, and disappearance of the eruption took place at different times on the different portions of the body. 4. The fading away of individual spots began at the centre and proceeded to the periphery. 5. Fever was absent, or was slight and of short duration. 6. The mucous-membrane phenomena were either very slight or entirely wanting. Conjunctivitis and sneezing never occurred in the way in which they occur in measles. 7. There was no desquamation. 8. There were no sequelæ.

# DIPHTHERIA, CROUP, PERTUSSIS, AND PAROTITIS.

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## DIPHTHERIA.

*Etiology.*—Recent investigations have much strengthened the theory that the Klebs-Loeffler bacillus causes diphtheria. Baumgarten<sup>854</sup><sub>No. 25, '90</sub> made observations on 10 cadavers who perished from diphtheria and 8 living subjects attacked with this disease, and in 2 cases of diphtheritic croup. In all these cases the Klebs-Loeffler bacilli were found in the superficial portion of the mucous membrane, and never in the deep portions. In most of the cases streptococci were also found. Paralysis occurred in dogs and pigeons, after subcutaneous and intra-cranial injections of cultures of the bacillus, whether they were filtered or not.

*Pathology.*—H. A. Sevestre, of l'Hôpital Trousseau, in Paris,<sup>202</sup><sub>Apr. 10</sub> has recently set forth advanced views in relation to the pathology of diphtheria, apparently to a great extent derived from the researches of those eminent bacteriologists, Roux and Yersin. The specific principle of diphtheria—the Klebs-Loeffler bacillus—commonly occurs only upon the surface, which is the seat of the diphtheritic inflammation, blood-poisoning taking place from the absorption of a poisonous substance which the bacillus secretes. Yet Roux and Yersin have ascertained that exceptionally this bacillus is found in the blood of diphtheritic patients. In true diphtheria it always occurs in the pseudomembrane and upon the contiguous inflamed surface, associated with other microbes.

The experiments of Klebs, Loeffler, Roux, and Yersin have shown that if a culture of the Klebs-Loeffler bacillus be filtered through porcelain the bacillus will be retained on the filter, but the liquid which passes through the filter contains a substance secreted by the bacillus, which has highly toxic properties. In

experiments upon animals, while the filtered liquid containing the toxic agent causes poisonous symptoms, it does not produce a pseudomembrane. A certain quantity of the filtered liquid injected into the peritoneal cavity of a guinea-pig or the blood of a hare causes progressive weakness, panting, or irregular respiration, often bloody urine, congestion of the inguinal and axillary glands, dilatation of certain blood-vessels, especially those of the kidneys and supra-renal capsules, effusions in the pleural cavity, etc., followed by death in five or six days. With a less degree of poisoning the animal lives longer, but suffers from paralysis. If the poisoning be more profound the animal succumbs after some hours, having presented symptoms of blood-poisoning, including diarrhœa.

We are therefore justified in attributing the severe constitutional symptoms in toxic diphtheria to the poison elaborated by the bacillus; but, in order to explain all the phenomena observed in severe diphtheria, we must also direct attention to the microorganisms associated with the Klebs-Loeffler bacillus, especially the different forms of staphylococcus and the streptococcus pyogenes. These microbes are found in the pseudomembranes and upon the adjacent inflamed surface. Moreover, these or allied micrococci occur in internal organs not reached by the Klebs-Loeffler bacillus in cases of diphtheritic blood-poisoning. Micrococci have been found in the glands, kidneys, and lungs, and in abscesses of the neck, complicating the angina of diphtheria. So far as we are able to determine from the facts observed, we infer that the inflamed mucous membrane, denuded of its epithelial covering by the diphtheritic process, allows these microbes to enter the system. Hence, while we no doubt correctly attribute systemic infection in diphtheria to absorption of a toxic substance secreted by the Klebs-Loeffler bacillus, the theory seems plausible that the other microbes, which abound in the pseudomembranes and are found also in the diseased internal organs, having probably been propagated from the surface, will be found, in future investigations, also to exert a pathogenic action. In the present state of our knowledge we must consider the local antiseptic measures, which destroy the Klebs-Loeffler bacillus, also useful to the patient by destroying other accessory germs.

*Klebs-Loeffler Bacillus in Healthy Individuals.*—Roux and Yersin<sup>17</sup><sub>Mar.14</sub> have found, in the mouths of healthy children and

adults, a bacillus which, in a morphological point of view, is identical with the Klebs-Loeffler bacillus. They found it not only at Paris, but also at a distant village, situated near the sea, where diphtheria had not occurred within the memory of man. In this village Roux and Yersin found, in 50 children examined, this pseudodiphtheritic bacillus in the mouth in 26. It does not differ from the Klebs-Loeffler bacillus either in its individual form or in the form of its colony, but only in the number of its colonies. Instead of producing a considerable culture in the *bouillon*, it only produces a slight culture. Hence, Roux and Yersin believe that this harmless bacillus is none other than the Klebs-Loeffler bacillus deprived of its virulence; they have been unable to produce its transformation into the genuine diphtheritic bacillus or the reverse, but they do not doubt that this transformation is possible. This bacillus is found most frequently in benign diphtheria and in persons recently cured of diphtheria.

*Prevalence and Death-Rate of Diphtheria.*—Janssens,<sup>52</sup> Nov., 90 the Director of Medical Statistics at Brussels, has recently prepared the following statistics, showing the present number of deaths from diphtheria to 100,000 inhabitants, probably during one year: England, 41; Belgium, 44; Holland, 53; Switzerland, 59; Italy, 79; France, 80; Germany, 100; Scandinavia and Russia, 110; Spain, 112; Austria-Hungary, 116; America, 140.

*Diagnosis.*—It is very important that an early and certain diagnosis be made of diphtheria and of those diseases which resemble it in appearance but are in their nature distinct from it. Failure to detect diphtheria in its early stages has in many instances resulted disastrously to patients, led to its propagation to others, and injured the reputation of the attending physicians. Fortunately this difficulty in diagnosis in obscure cases, which has long been the opprobrium of the profession, is remedied to a great extent by the discovery of the cause of diphtheria. If the microscopic examination of the secretions removed from the diseased part shows the presence of the Klebs-Loeffler bacillus, the diagnosis of diphtheria can be confidently made. In repeated instances during the last year bacteriologists have called attention to this fact, and renowned clinical observers have been enabled to make a positive diagnosis from ascertaining the presence or absence of this microbe.

*Prophylaxis.*—Loeffler has ascertained, in his experiments with the Klebs-Loeffler bacillus, that solutions of the following substances in the strength mentioned are sufficiently germicidal to sterilize cultures: Corrosive sublimate, 1 part to 10,000 or even 15,000; cyanide of mercury, 1 part to 8000 or 10,000; chlorine-water, 1 part to 1100; thymol, 1 part to 500, with 20 per cent. of alcohol. Loeffler advises that physicians, nurses, and others exposed to diphtheria gargle every three or four hours with one of these substances. Frequent bathing of the hands, face, and head with a disinfectant, and frequent change and disinfection of the clothes worn in the sick-room should also, says Loeffler, be enjoined. Grancher, of Paris, <sup>443</sup><sub>Dec. 20, '90</sub> who has had a large experience in the treatment of diphtheria, expresses the opinion, in a recent paper, that in nearly all instances diphtheria is communicated by infected articles of clothing or furniture. He also thinks that there is evidence that the non-pathogenic bacillus often present upon the healthy buccal surface may, under exceptional circumstances, become pathogenic, so as to cause diphtheria. Except under such circumstances, he believes that the spread of diphtheria may be prevented by the prompt and thorough disinfection of the sick-room and infected articles and persons. He states that in a ward set apart for diphtheritic patients in Paris, among 1741 admitted during a series of years 153 children were found not to have diphtheria, and yet, by the disinfection employed, not one of them contracted the disease. In a moist atmosphere the Klebs-Loeffler bacillus is killed at a temperature of 60° C. (140° F.), but in a dry atmosphere a temperature of at least 98° C. (208.4° F.) is required to destroy it. Grancher has prevented the spread of diphtheria in the hospital ward by the following prophylactic measures: A metallic screen surrounds the bed; all articles used by the patient—as spoons, forks, and napkins—are disinfected by being placed in boiling water containing the sodium carbonate, 1 ounce (31 grammes); boiling water, 1 pint (480 grammes). The bedding and all clothes used are disinfected by heat, and the floor, bedstead, and walls are washed with the corrosive-sublimate solution. Nurses and medical attendants wear blouses that are disinfected by heat each day, and they wash themselves with a solution of corrosive sublimate or a 5-per-cent. solution of carbolic acid.

Recent observations confirm the belief that the schools are

largely instrumental in disseminating diphtheria, and that the action of Health Boards compelling the non-attendance at school of children living in domiciles where diphtheria is prevailing is not only fully justified, but that more stringent precautionary measures are needed. R. T. Thorn, Lecturer on Public Health at St. Bartholomew's Hospital,<sup>6</sup><sub>Mar.7</sub> stated, in his third lecture on diphtheria, that, at Pirbright, each time the schools were closed diphtheria practically came to an end, and whenever they were re-opened it recommenced suddenly and in a fatal form. This occurred without any obvious source of infection, although much care was taken to detect it.

In my practice during the last five or six years the following prescription has been employed for the purpose of disinfection in the treatment of diphtheria as well as scarlet fever:—

R Acidi carbolic, . . . . .  
Ol. eucalypti, . . . . . āā 1 ounce ( 31 grammes).  
Spts. terebinth., . . . . . 8 ounces (240 grammes).—M.

Add 2 tablespoonfuls to 1 quart (1 litre) of water, in a tin or zinc wash-basin, or a pan with broad surface, and maintain a constant state of ebullition or simmering in the room occupied by the patient. A vessel with a broad surface is required for the purpose of producing a large amount of vapor and to prevent ignition of the turpentine, which has occurred in three instances when my directions were not strictly followed. Observations in regard to the use of this vapor thus far appear to show that, while it is not unpleasant to the patient and attendants, it is an efficient germicide, preventing, to a considerable extent, the propagation of the disease to others, and enabling the physician to visit subsequent patients without the risk—or with much less risk—of communicating diphtheria through his infected person or clothing. In the quarantine ward of the New York Infant Asylum, where the vapor was used, no subsequent case occurred.

In a paper published by Charles Smith, of Australia,<sup>285</sup><sub>Oct.15</sub> the use of this vapor is strongly recommended, not only as a prophylactic, but curative agent; but he does not employ it in the manner recommended above. He prescribes, what he designates a weak mixture, 1 ounce (31 grammes) of oil of eucalyptus, 1 ounce (31 grammes) of carbolic acid, and 8 ounces (240 grammes) of turpentine; or, a stronger mixture containing the same amount of

carbolic acid and eucalyptus, with 6 or 4 ounces (186 or 124 grammes) of turpentine. A stronger mixture, he believes, would not be tolerated by some on account of its pungency. The following are Smith's directions for the use of the vapor:—

“In the mixture soak two cloths,—linen or otherwise,—about a foot square; place one close to the face, the other on the pillow near the head, on pieces of paper, to avoid unnecessary soiling of the bed-clothes. In adults, or children over 8 or 10 years of age, one or two other cloths of the same size may be soaked and hung about the cot,” or several cloths soaked with the liquid may be used in the room. The nurse must see that a strong vapor is generated near the patient's mouth. Smith states that, in patients thus treated who recover, diphtheritic paralysis never occurs, and I do not recollect that I have seen a case of paralysis following diphtheria in my practice—during the last three or four years—since employing this treatment. If future observations correspond with those of Smith and myself, it is evident that this vapor is destructive to the bacillus, or the poison which it generates. Smith, in order to show the curative power of the vapor, relates the case of a patient in whom “the whole fauces, in addition to being greatly swollen, so that swallowing was nearly impossible, were covered throughout—including the front of the palate and uvula—with a thick deposit.” The usual remedies—including mercury, given so as nearly to produce salivation—were ineffectual. The vapor was now used; in twelve hours, improvement in the state of the fauces was perceptible, and in five days the pseudomembrane had disappeared. I presume, from my knowledge of this vapor—acquired by its use during five or six years—that Smith claims too much for it; but I think the evidence is sufficient that it is a useful prophylactic, enabling physicians attending diphtheritic cases to visit other families with little danger of communicating the disease by infection of his person or clothing. I would request physicians who prescribe this vapor to observe whether it prevents diphtheritic paralysis, as stated by Smith and as my observations seem to show.

*Treatment.*—No important change, no decided improvement has apparently been made in the internal or constitutional treatment of diphtheria during the last twelve months. In France, Great Britain, and America the chloride of iron has been more

employed than any other remedy since Aubrun, Sr., highly extolled its use.<sup>100</sup><sub>1859</sub> In this country the tincture of the chloride of iron has been and is still prescribed almost to the exclusion of all other ferruginous preparations during the acute period of diphtheria. Physicians who are summoned to cases of diphtheria notice the pallor, loss of appetite, flesh, and strength, even in the first week in severe cases, and more notably subsequently. The use of iron is at once suggested as a useful remedy to arrest this blood-change. By its action on the red corpuscles, which are the carriers of oxygen, it increases the functional activity of organs and improves the general nutrition. The ferruginous preparations, therefore, hold an important place in the therapeutics of diphtheria, and, while other remedies which a few years ago were highly extolled are passing out of use, the tincture of the chloride of iron is apparently as much employed as formerly, although such eminent observers as Barthez and Sanné oppose its use, stating that it does not prevent the formation of the pseudomembrane, that it causes dysphagia, and is painful. These observers have probably noticed dysphagia and pain from the use of the strong solution of the chloride of iron employed in France, and not from the officinal tincture prescribed in the United States. Physicians in this country, during their entire professional career, prescribe this tincture in large and frequent doses, and speak well of its action, not observing the ill effects mentioned by Barthez and Sanné. On the other hand, the potassium chlorate is much less prescribed than formerly, and when employed it is used in smaller doses. The belief that it irritates the kidneys and is a factor in producing the nephritis, which is so common in this disease, deters many from prescribing it. Moreover, good observers like Jules Simon, although they acknowledge its efficacy in diseases of the buccal cavity, believe that it does little or no good in diseases of the fauces. We have stated in the ANNUAL of last year that, according to Brieger and Fraenkel, the poisonous agent secreted by the Klebs-Loeffler bacillus, which agent produces the systemic infection or blood-poisoning in diphtheria, has the following composition:—

Carbon,	.	.	.	.	.	.	.	.	45.85.
Hydrogen,	.	.	.	.	.	.	.	.	7.13.
Azote,	.	.	.	.	.	.	.	.	16.33.
Sulphur,	.	.	.	.	.	.	.	.	1.89.
Oxygen,	.	.	.	.	.	.	.	.	29.80.

Search is still made for an antidote which will antagonize or destroy this poison in the blood, and investigations in this direction have been partially successful. Corrosive sublimate has perhaps been more prescribed than any other agent for the purpose of disinfecting the blood, one poison being employed to neutralize or destroy another. Still, with the internal use of corrosive sublimate to the full extent within non-poisonous limits, cases of severe diphtheria perish. Whether or to what extent corrosive sublimate may disinfect the blood and be instrumental in saving life, from its action in antagonizing or destroying the poison, must be determined by future statistics.

In France the sodium benzoate has recently been prescribed for the internal treatment of diphtheria by physicians of prominence. Closson<sup>293</sup> recommends it in the following doses: For children under the age of 1 year, 7 to 8 grammes (105 to 120 grains), daily, in divided doses; for those at the age of 2 to 3 years, 8 to 10 grammes (120 to 150 grains); for those over the age of 7 years, 10 to 15 grammes (150 to 225 grains). For gargling and nasal irrigation a 5-per-cent. solution of the sodium benzoate is employed. It is said that this medicine can be administered a considerable time with safety, while it is a disinfectant, and has solvent properties.

Loeffler<sup>55</sup><sub>June 13</sub> has published a very instructive paper, detailing the action of various medicinal substances upon cultures of the Klebs-Loeffler bacillus, as observed in his laboratory. The temperature and nature of the culture media were made to conform as nearly as possible to the conditions in those affected with diphtheria.

*Corrosive Sublimate.*—A solution of 1 part to 10,000 instantly destroyed germs upon the surface of the culture media, and most of them were destroyed by a solution of 1 part to 20,000. A solution of 1 part to 1000 required twenty seconds to destroy bacilli in deep portions of the culture media.

*Nitrate of Silver.*—A solution of 1 part in 1000 sterilized in ten seconds the surface of the culture medium for one day. A solution of 1 part to 150 was required to destroy the bacillus, and a contact for twenty seconds was required to destroy the colonies of the bacilli.

*Potassium Permanganate.*—Even a 5-per-cent. solution was ineffectual as a sterilizer.

*Potassium Chlorate.*—A solution of 1 part to 20 was ineffectual as an antiseptic.

*Iodine.*—A watery solution was useless. Cultures were sterilized in twenty seconds by a solution of iodine, 5 parts; iodide of potassium, 10 parts; water, 300 parts.

*Bromine.*—A 1-per-cent. solution destroyed superficial germs; but a 2½-per-cent. solution, for twenty seconds, was necessary for complete sterilization of the culture.

*Chlorine, Chloride of Lime.*—Undiluted chlorine-water sterilized cultures in twenty seconds. A concentrated solution of chloride of lime was an active disinfectant.

*Alcohol and Ether.*—These agents, used separately, failed to sterilize in twenty seconds; but a mixture of 2 parts of absolute alcohol, 1 of water, and 1 of ether produced immediately the most decided antiseptic effects. Amylic alcohol was feebly germicidal; but benzylic alcohol and chloroform sterilized in ten seconds.

*Carbolic Acid, Creasols.*—A solution of carbolic acid (1 part to 100) was ineffectual; but a 3- or 4- per-cent. solution momentarily arrested the development of germs. A 2-per-cent. solution, with 20 to 40 per cent. in volume of alcohol, was strongly germicidal. The use of the creasols gave a similar result to that of carbolic acid.

*Salicylic Acid, Resorcin.*—Both these agents gave poor results.

Loeffler employed a considerable number of other substances, in order to determine their germicide action on the Klebs-Loeffler bacillus, but some of them could not be safely prescribed for patients on account of their toxic properties. The importance of his experimental investigations in order to determine the germicide action of different medicines is evident, since they show that agents which are largely employed, as potassium chlorate, potassium permanganate, salicylic acid, and resorcin, are but feebly antiseptic; and they enable us to determine how small a quantity of powerful agents, which must be used with caution,—as corrosive sublimate,—may be employed, and exert sufficient antiseptis.

Recent observations during the last twelve months increase the conviction that our main reliance in combating diphtheria, which has now encircled the globe, must be on prompt and efficient prophylactic measures and early and proper local treatment.

*Local Treatment.*—As in the internal treatment, so in the local, the number of remedies employed and recommended is very large. Even the enumeration of those recommended in the medical journals during the last year would be tedious. As regards most of them, there can be little doubt that the fact that a large percentage have recovered during their use has been due to the mildness of the disease rather than to the benefit obtained from the remedies. Still, in the United States and Canada an apparent improvement has recently been made in the local treatment by the use of the peroxide of hydrogen. Employed as a spray or gargle, it appears to be scarcely inferior to corrosive sublimate as a germicide, while it does not inflame or injure the mucous surface to which it is applied. It has no poisonous properties, is highly penetrating; it disinfects and cleanses the surface of mucopus, and it sterilizes the pseudomembrane, which it gradually dissolves and renders thinner. A professor in one of our interior medical colleges (W. A. Dickey,

of the Toledo Medical College), who has apparently had considerable experience with this agent, writes <sup>23</sup><sub>Dec., '90</sub> of the peroxide as follows: "The large number of physicians in this country who employ this remedy will not, I think, regard his remarks as an exaggeration, or as not justified by the facts, if we restrict the comparison to those remedies that are not poisonous and that do not injure the mucous surface. "Take it all in all," says Dickey, "I think in the peroxide of hydrogen we have a remedy of the greatest value in combating this dangerous malady. None will destroy the false membrane and bacilli more speedily and with more certainty." Used upon the fauces in full strength as a gargle or spray, patients complain that it produces smarting, and my observations lead me to think that in some instances it is irritating. It is, therefore, probably best to employ it for the fauces, diluted with an equal quantity, and for young children even with treble its quantity, of water. When prescribed for irrigation of the nostrils it should be diluted with four or five times its quantity of water, since, if employed of the strength which is proper for the fauces, it is painful, and its use is likely to be resisted. In order to insure complete disinfection, a solution of corrosive sublimate may also be employed within safe limits in the intervals of the use of the peroxide. Since the local treatment of diphtheria by the peroxide of hydrogen, aided, perhaps, by the cautious use of the solution of corrosive sublimate, has become so general in the United States, the treatment employed this side the Atlantic is, I think, more efficient and trustworthy than that prescribed by the most distinguished physicians in Europe.

Henoch, the highest authority in diseases of children in Germany, and President of the Pædiatric Section of the Tenth International Medical Congress, states <sup>319</sup><sub>Apr. 11</sub> that, after many disappointments, he now prescribes acetic acid as a spray for young children and as a gargle for those that are older. Perhaps he prescribes this drug in consequence of the statement made by Roux and Yersin that acidulation of the diphtheritic products diminish their virulence. It is interesting to learn the result of Henoch's treatment. In the same paper he reports the result in 192 cases of diphtheria, exclusive of scarlatinal pseudomembranous pharyngitis, which he differentiates from true diphtheria. In 110 of these cases of genuine diphtheria the inflammation was limited to the pharynx or pharynx and nares, and in the re-

maining 82 it extended to the larynx, producing diphtheritic croup. Of the 110 cases of pharyngeal diphtheria 32 died; in 70 of the 82 cases of diphtheritic croup tracheotomy was performed; the remaining 12 were too sick for operative measures. Of the 70 cases operated on, only 9, or 13 per cent., recovered. Such an unfavorable result of tracheotomy Henoch attributes to the bad state of the patients and the surroundings, and especially to the exclusion in the statistics of all cases of idiopathic croup. In non-diphtheritic croup he has had 60 per cent. of cures by tracheotomy. It will be observed that this distinguished physician recognizes a croup occurring independently of diphtheria,—a subject much discussed in this country.

Among the remedies prescribed in Europe which are not often employed in this country salicylic acid<sup>232</sup><sub>Nov., '90, et seq.</sub> may be mentioned. Cadet de Gassicourt and Bergeron did not find this agent efficacious, but Jules Simon employs it in the following formula, used by brush or spray or as a gargle:—

R Acidi salicylici, . . .	0.50 to 1.20 gramme	(7 $\frac{3}{4}$ to 15 $\frac{1}{2}$ grains).
Alcohol, . . .	q. s. ad solutio et adde	
Glycerinæ, . . .	40.00 grammes	(1 $\frac{3}{8}$ ounces).
Infus. eucalypti, . . .	60.00 grammes	(2 ounces).—M.

Hallopeau employs the following formula for local treatment since 1877, with, he states, an apparent good result:—

R Aquæ,		
Glycerinæ, . . . . .	āā 20.00 grammes	(5 $\frac{1}{4}$ drachms).
Acidi salicylici, . . . . .	0.50 gramme	(7 $\frac{3}{4}$ grains).
Spts. rectific., . . . . .	q. s. ad solut.	—M.

D'Espine undertook a series of experiments in order to determine the efficacy of different antiseptics, and gave the preference to salicylic acid in the strength of  $\frac{1}{2}$  to 2 parts in 1000. Huchard employs salicylic acid in the same manner as d'Espine. The following is the formula of Bergeron:—

R Acidi salicylici, . . . . .	4 grammes	(62 grains).
Spts. rectific., . . . . .	40 grammes	(1 $\frac{1}{4}$ ounces).
Aquæ destillat., . . . . .	80 grammes	(2 $\frac{3}{4}$ ounces).—M.

Parisot<sup>67</sup><sub>Sept. 15</sub> also highly recommends irrigation of the fauces with a solution of salicylic acid, employing the following formula:—

R Acidi salicylici, . . . . .	1 gramme	(15 $\frac{1}{2}$ grains).
Aquæ, . . . . .	980 grammes	(1 quart).
Spts. rectific., . . . . .	20 grammes	(4 $\frac{3}{4}$ drachms).

M. Sig. : Dissolve the salicylic acid in the alcohol and add the water.

Parisot says that in grave cases the oftener irrigation is practiced the better, and he employs a syringe for this purpose. He believes that this solution is destructive to the pseudomembrane. The "exudate disappeared rapidly," and it was "reproduced more slowly and imperfectly than when the throat was cleared by any other process."

G. F. Cadogan-Masterman<sup>26</sup><sub>Dec., '90</sub> recommends the local use of sulphur, employed as follows:—

R Sodii hyposulphitis, . . . . .	2 drachms ( 7.78 grammes).
Aquæ, . . . . .	8 ounces (240.00 grammes).—M.
R Acidi hydrochlorici dilut., . . . . .	3 drachms ( 11.66 grammes).
Aquæ, . . . . .	8 ounces (240.00 grammes).—M.

Mix one tablespoonful of each in the bottle of a hand-atomizer and spray immediately. This combination forms a milk of sulphur in the finest possible subdivision. Only so much should be mixed as is needed each time, since the sulphur soon settles in a firm cake.

Gaucher recommends removal of the pseudomembrane two or three times daily by a stiff camel-hair pencil, or a swab of absorbent cotton, or in some instances by the forceps, and this is followed immediately by the application of a mixture consisting of 20 grains (1.3 grammes) of camphor, 5 grains (0.32 gramme) of crystallized carbolic acid, 15 grains (0.97 gramme) of castor-oil, 10 grains (0.65 gramme) of alcohol, and 1 grain (0.065 gramme) of tartaric acid. In the interval the throat is washed every two hours with a 1-per-cent. solution of carbolic acid in water. The foreign medical journals are filled with prescriptions like the above, employed with a good result in a certain number of cases, probably because the type of diphtheria happened to be mild. The practical physician will, I think, prefer the equally or more efficient and much simpler local treatment by the peroxide of hydrogen frequently applied, and the occasional use, within safe limits, of a solution of corrosive sublimate, with perhaps, for irrigation of the nostrils every second hour, a warm solution of boracic acid, 1 drachm (3.75 grammes), and the sodium borate, 2 drachms (7.50 grammes) to  $\frac{1}{2}$  pint ( $\frac{1}{4}$  litre) of water.

*A New Mode of Local Treatment of Diphtheria.*—At the recent meeting of the American Medical Congress in Washington, Seibert<sup>51</sup><sub>June</sub> recommended a new mode of local treatment of diphtheria,

and exhibited the instrument employed by him. The purpose of the treatment is to destroy the microbes in the deeper portion of the pseudomembrane and the mucous membrane, which Seibert says are not reached by the ordinary treatment. The instrument devised by him consists of five needle-points—like the points of a hypodermatic syringe, only much shorter—arranged on a flat disc. Their length is sufficient to penetrate the pseudomembrane and inflamed and swollen mucous membrane, and eject the antiseptic fluid upon their under surface. The points wound the superficial capillaries and cause some hæmorrhage. The liquid employed is freshly made chlorine-water of the U. S. Pharmacopœia. In the discussion at the reading of the paper both favorable and adverse opinions of this operation were expressed.

*Curettng Followed by the Application of Peroxide of Hydrogen.*—David Phillips, of New York, <sup>59</sup><sub>Apr. 11</sub> recommends the application to the pseudomembrane of an equal quantity of Marchand's peroxide of hydrogen and water; then scraping the membrane with a curette, like Thomas's small uterine curette, and after the curetting the application of peroxide of hydrogen, diluted one-third, every hour for six or seven hours, and subsequently at longer intervals. But a strong objection to the use of instruments that cause hæmorrhage is the fact that the open vessels may receive microbes and poisonous agents secreted by the microbes, and convey them to the internal organs.

*Diphtheritic Cardio-Pulmonary Paralysis.*—Camille Fromaget, Interne of the Hospital of Bordeaux, <sup>118</sup><sub>Apr.</sub> reports the following interesting case: Marie, aged 6 years, was brought to the hospital on November 20, 1890, having severe diphtheritic angina of two days' continuance. The larynx was already involved, the cough being hoarse, the voice husky and almost extinguished. Contrary to the advice of the interne the parents took her away, but brought her back on November 28th on account of the dyspnœa. Her general condition was bad; she was cool; her inspiration labored and noisy, and her aspect almost cadaveric. She had suffocative attacks at intervals, and her cough was hoarse, her voice extinguished. She had supra- and sub-sternal depression on inspiration, and the tonsils, uvula, and a great part of the fauces were covered by pseudomembrane. Auscultation showed that respiration was limited to the summits of the lungs. The dyspnœa

increased, the pulse became frequent and feeble, and the temperature reached 39° C. (102.2° F.). Tracheotomy was quickly performed, with little loss of blood, after which the examination revealed the presence of disseminated râles in both lungs. A potion of 1 drachm (3.75 grammes) of benzoate of sodium, milk-punch, and syrup of quinine was administered to counteract the blood-poisoning, and applications were made of a solution of corrosive sublimate (1 part to 1000).

November 30th. Pseudomembrane has been expectorated through the cannula, but the buccal and faucial pseudomembrane persist, and fine subcrepitant râles occur in the left lung and the lower part of the right lung.

December 1st. The pseudomembranes have in part disappeared, but the pulmonary symptoms continue; pulse frequent and feeble; no diarrhoea; no albuminuria. At 2 P.M. sudden and intense dyspnoea occurred; the face and extremities were pallid. The cannula was cleaned without relief, the trachea was free, and the lungs were permeable, showing that obstruction to respiration did not exist in them. The dyspnoea with the Cheyne-Stokes respiration continued, the pulse was almost imperceptible, and at 4 P.M. the child raised itself in the crib and fell back dead.

The examinations in this case clearly indicated a healthy state of the kidneys and the absence of uræmia. The symptoms and history corresponded exactly with those of cardio-pulmonary paralysis, as related in standard treatises. Cadet de Gassicourt records 15 cases of cardio-pulmonary or bulbar paralysis in 101 cases of diphtheritic paralysis. Ten of the 15 had also palatal paralysis, and the remaining 5 had general paralysis. He had never observed a case of cardio-pulmonary paralysis in a diphtheritic patient which was not associated with some other form of paralysis. In the case related above the heart was of normal size and consistence; it did not show any trace of endocarditis, and the cardiac muscular fibres had their normal appearance. That death did not occur from thrombosis in the cavities of the heart was evident from the fact that the thrombi in this organ were not attached to the walls of the cavities, but lay loose in them, showing that they were formed at the moment of death. The examination also showed that the lungs were sufficiently healthy for the wants of the system. We are thus forced to the conclusion that

the cause of death in the case just related was cardiac paralysis, or, as it is sometimes designated by transatlantic physicians, bulbar paralysis, in the belief that it is due to paralysis of the medulla oblongata.

Peraté and Villard believe that the cause of this paralysis is a neuritis of the pneumogastric nerve or a bulbar or spinal inflammation; but many observers have searched in vain for this cause. Gombault made minute examinations in 3 cases, and could discover no disease of the medulla or of the spine or pneumogastric. Nor did the blood-vessels examined by him present any abnormality sufficient to cause the sudden death, the large number of leucocytes being insufficient to produce such a result. Finally, Roux and Yersin produced diphtheritic paralysis in animals to which they had communicated diphtheria by inoculation, and carefully-conducted post-mortem examinations of those that died did not reveal any structural change in the medulla, which would be likely to sustain a causal relation to the paralysis. They believe that they have demonstrated that the paralysis results directly from the action of the diphtheritic poison on the nervous system. The inference is therefore justifiable that, in the case related above and in similar cases recorded in the literature of diphtheria, the sudden death, so similar to that from uræmic poisoning, resulted from what Fromaget designates "bulbar poisoning by diphtheritic toxines." One is reminded that Trousseau, twenty-five years ago, when the literature of diphtheria was comparatively meagre, held the same opinion in regard to the etiology of diphtheritic paralysis,—that it is not due to any structural change in the muscles or nervous system, but to the paralyzing action of the diphtheritic poison on the function of the heart.

*Diphtheritic Myocarditis.*—G. Schemm<sup>20</sup><sub>B.112,H.2</sub> has examined the myocardium in 13 cases of this inflammation. He found granulo-fatty degeneration of the muscular fibres, with hyperplasia of the cells of the connective tissue and swelling and proliferation of the nuclei. In some of the cases he found hæmorrhagic exudation in the myocardium.

*Diphtheria and Gangrene.*—Girode<sup>92</sup><sub>No.1</sub> recalls the fact that, before the time of Bretonneau, diphtheritic angina was frequently confounded with gangrene, and he endeavors to show that true gangrene not infrequently occurs in diphtheria, recalling cases of

gangrene complicating diphtheria reported by Pilliet and Barthez, Becquerel, Gubler, and Millard. He relates the case of an old man who died of hypertoxic diphtheria of four days' continuance. Gangrene had destroyed the right tonsil and the adjacent tissues. The inflammation had extended to the right internal carotid, the coats of which were thickened, brown, and softened, and its lumen was filled by an adherent, dark clot, fifteen lines in length. Girode also relates the experiments on animals by Roux, who inoculated them with the Klebs-Loeffler bacillus, and found that this microbe might develop in great numbers in the tissues subjacent to the pseudomembrane, producing cellular infiltration and thrombosis, ending in gangrene. The inference from Girode's investigations is, that while diphtheria is, in its anatomical characters, a superficial malady, the specific process may extend to the tissues underlying the pseudomembrane and in immediate relation with it, so enfeebling their vitality and causing molecular destruction that more or less gangrene results. This idea is not new. It has long been known and taught in standard treatises that the diphtheritic pseudomembrane penetrates and destroys the mucous membrane upon surfaces lined by pavement epithelium, so that an ulcer results if the patient lives long enough, and it is not improbable that a greater and deeper destruction of tissue, which may be designated gangrene, occurs in those that are markedly cachectic or debilitated.

J. L. S.

## CROUP.

Markham<sup>139</sup><sub>Aug.</sub> proposes the following tables to aid in the differentiation between croup and diphtheria:—

MEMBRANOUS CROUP.	DIPHTHERIA.
1. Absence of fever or any systemic symptoms.	1. Constitutional disturbances various and severe.
2. Non-contagious.	2. Highly contagious.
3. Membrane is invisible in throat.	3. Secretion covers tonsils and pharynx.
4. No signs of blood-contamination.	4. Deposit forms on various abraded parts of the body.
5. History contemporaneous with medicine.	5. Of relatively modern date.
6. No assumption of bacilli.	6. The bacillus clearly demonstrated and cultivated.

Dodge<sup>19</sup><sub>Mar. 21</sub> groups the significant points as follows:—

MEMBRANOUS CROUP.	DIPHTHERIA.
None of these.	1. Known exposure to the disease.
	2. Albumen in urine.
	3. Prodromic symptoms adynæmic.

The diagnosis between catarrhal and membranous croup may be made on the absence of fever in the latter, catarrhal croup in the child being a febrile disease; also, membranous croup occurring in a patient under the age of 1 year is uncommon, while 20 per cent. of the cases of catarrhal croup are under the age of 1 year. An interesting discussion by the members of the Louisiana State Board of Health <sup>12</sup><sub>May</sub> in reference to the identity of diphtheria and membranous croup apropos of the following resolution—"WHEREAS, Cases of membranous croup are considered by many physicians as causes of true diphtheria; *Resolved*, That hereafter all cases of so-called membranous croup be reported to the Board of Health, and all precautions recommended in cases of diphtheria be adopted against said cases of membranous croup"—resulted in the motion being lost. Cases of membranous croup in the State of Louisiana will, therefore, be neither reported nor disinfected.

*Treatment.*—Years ago Trousseau prescribed inhalations of chloroform during attacks of croup, and the idea has been recently utilized by Betz, <sup>297</sup><sub>No. 96</sub> who treats cases of laryngeal and tracheal stenosis with inhalations of 3 drops of a mixture containing sulphuric ether, 3 parts; acetic ether, 2 parts; menthol,  $\frac{1}{16}$  part. The inhalation may be repeated every fifteen minutes if necessary. Pease <sup>72</sup><sub>Apr.</sub> reports 4 cases of croup treated with muriate of pilocarpine, resulting in 2 recoveries. The dose employed was  $\frac{1}{12}$  grain (0.0054 gramme) hourly, until the constitutional symptoms were obtained. Bates <sup>2</sup><sub>Apr. 18</sub> applies a solution of nitrate of silver, 18 grains (1.10 grammes) to the ounce (30 grammes), by means of a piece of lint wrapped around a wire, as far down the throat as can be reached (to the larynx?). During the discussion of this treatment, Rickards said that he had applied nitrate of silver in 7 cases of croup with rapid relief. Hubbard <sup>59</sup><sub>Apr. 11</sub> calls attention to the value of the hydrochlorate of ammonia: (1) as a heart stimulant; (2) in relieving the spasm and œdema of the glottis; and (3) in softening the membrane.

Dodge <sup>19</sup><sub>Mar. 21</sub> gives bichloride, from  $\frac{1}{6}$  to 1 grain (0.011 to 0.065 gramme), in divided doses; well diluted, during twenty-four hours, and, locally, employs sulphur by insufflation; he also gives sulphur internally, in small and frequently repeated doses.

Starr <sup>207</sup><sub>Apr.</sub> advises the administration of calomel, in small and frequently repeated doses; for example, a child from 2 to 3

years old, after first having a dose of 2 grains (0.13 gramme), should be given 1 grain (0.065 gramme) every hour; if this dose inclines to purge, paregoric may be given to check it. When freedom of respiration is secured, the calomel should be discontinued and an action of the bowels secured; with this treatment there is very little danger of salivation.

Waxham<sup>779</sup><sub>Sept.</sub> reports a case of croup, with fatal termination, in a lady of 60 years, who had had several attacks of spasmodic croup at about 40 years of age. Waxham intubated her and, as the membrane was pushed before the tube, withdrew the latter at once; this was followed by the expulsion of a membranous cast of the whole trachea, with relief of all symptoms for twenty-four hours, when symptoms of pulmonary obstruction supervened and the patient sank. Murphree<sup>86</sup><sub>Apr.</sub> reports at length a case of membranous croup in which he performed tracheotomy with entire success.

In an address before the Douglass County Medical Society, Ground<sup>105</sup><sub>Sept. 1</sub> made a strong plea for the employment of intubation instead of tracheotomy in croup, and cited the following indications for the performance of the operation: "Given a case of membranous laryngitis, with hoarseness increasing to whispering, with cough short and explosive, becoming high-pitched and prolonged, diminution of or absence of the vesicular breathing, over the lower posterior lobes of the lungs, beginning recession of the epigastrium and beginning restlessness, the call is for immediate removal of the obstruction. Note especially the character of the voice and cough: if these become progressively worse, the child's best interests will be served by delaying no longer the necessary intubation.

*Prognosis.*—According to Dodge,<sup>19</sup><sub>Mar. 21</sub> the younger the patient the higher the mortality, because of the small size of the trachea and larynx and because stenosis sooner results; the prognosis is unfavorable in the mildest cases; unfavorable symptoms are increasing debility and cyanosis, feeble and irregular pulse, and the development of bronchitis or broncho-pneumonia.

#### PERTUSSIS.

*Diagnosis.*—In a clinical lecture Hare<sup>144</sup><sub>July</sub> showed a case of what he called an aberrant form of pertussis, characterized by attacks of spasmodic cough without any croup; only on one or two occasions had this interfered with breathing sufficiently to excite alarm.

Guido described, before the Italian Congress of Pædiatry (Rome, 1890), a form of paroxysmal and spasmodic cough which resembles whooping-cough, and yet which is not that disease. Especially had he noticed these cases occurring during the epidemic of influenza, with the following distinguishing features: greater frequency of the attacks at night, seldom any vomiting, and the signs of bronchitis less disseminated than usual in whooping-cough; absence of hæmorrhages. The bacillus of Afanasieff was not present. An irregular form of pertussis is described by Eigenbrodt,<sup>114</sup> characterized by entire absence of symptoms during the day, but the appearance at night of typical symptoms. The disease is contagious, but does not give immunity from ordinary pertussis.

*Incubation.*—Peskind,<sup>222</sup> Dec., '90 reports the case of a child born into a family where whooping-cough had been raging for a month. The mother was not affected; five days after the birth of the child it began to cough, and the other symptoms followed; that would, of course, place the period of incubation at five days if we could eliminate the fact that possibly the child was affected *in utero*.

*Duration.*—Hare,<sup>19</sup> Jan. 10 puts the duration at from six to eight weeks. German writers set the limit at sixty-two days, and during this period the child should be isolated from other children.

*Recurrence.*—Le Gendre,<sup>118</sup> Nov. reports a case of whooping-cough recurring after fifteen years. This is very rare, the only other cases on record being 8 in number,—1 observed by West, 2 by Trousseau, and 5 by Roger.

*Treatment.*—An infusion of wild thyme (*thymus vulgaris*) has been employed by Neovius,<sup>498</sup> Mar. in a considerable number of cases during an epidemic of pertussis. The infusion is made of 100 grammes ( $3\frac{3}{8}$  ounces) of the herb, 700 ( $1\frac{1}{2}$  pints) of water, and 50 ( $1\frac{3}{4}$  ounces) of *syrupus malvæ*, the dose varying from 1 teaspoonful to 1 tablespoonful, according to the age of the child, from eight to twelve times daily. The results were far beyond the experimenter's hopes, and he confidently asserts that thyme affords the best remedy for whooping-cough yet known. All of the painful symptoms accompanying the affection subside in one or two days from the beginning of the treatment, which almost always brings about a complete cure within fifteen days. The remedy likewise prevents all the usual inflammatory symptoms complicating the disease. The only disagreeable symptom is a diarrhœa that

appears on the second or third day of treatment, which, however, may depend on the syrup of mallow. To secure the best effects, the perfectly fresh plant must be used.

Pure benzole has been employed with success by Robertson<sup>6 Aug. 8</sup> in pertussis affecting both adults and children, all deriving equal benefit; in cases where convulsions and other complications were fast reducing the patient, this remedy has been used with great success, decreasing the number of attacks from twenty or thirty during the night to two or three; the dose is 2 minims (0.13 gramme), in mucilage, for a child 6 months old, and 5 minims (0.32 gramme) for an adult.

Antipyrin has many advocates. Hare<sup>19 Jan. 10</sup> believes it to be the best remedy as yet discovered for the treatment of whooping-cough. To a child of 10 to 12 years, 2 grains (0.13 gramme) every three hours until the effect is obtained, and then every four or five hours. The effect of the drug must be watched carefully, stopping it on the appearance of any bluing of the face or finger-nails. According to Hare, the cyanosis first appears under the thumb-nail, as it does when using antifebrin. This drug must be stopped when it causes profuse sweating. Muttler<sup>61 Aug. 15</sup> agrees that the administration of antipyrin is the most satisfactory method of treating whooping-cough.

Schmid<sup>59 June 13</sup> directs that the following mixture should be used, by means of an atomizer, every three hours:—

R Acidi carbol.,	6 grains	( 0.39 gramme).
Menthol (4-per-cent. solution),	4 drachms	(15.00 grammes).
Cocainæ (3-per-cent. solution),	3 drachms	(11.66 grammes).
Glycerinæ,	1 drachm	( 4.70 grammes).
Aquæ laurocerasi,	1 ounce	(30.00 grammes).—M.

The nozzle of the instrument should be directed as far into the mouth of the patient as possible. This observer gives several cases in detail, which seem to substantiate his claims as to the efficacy of this mode of treatment.

A simple method is recommended by Séjournet<sup>577 Dec. '90</sup>: merely confining the patient to two rooms,—one for day- and the other for night- time. Each room is thoroughly aired when not in use.

Emile Müller<sup>168 July 1</sup> relates the case of an infant, not quite a year old, with whooping-cough, who was vaccinated, and in about ten days the convulsive attacks ceased. Vaccination has also been employed by Cachoza<sup>369 No. 6</sup> in 5 cases of whooping-cough, with the result that the cough ceased to be spasmodic, and entirely disappeared after eight or ten days.

Bromoform has found another advocate in Krieger,<sup>85</sup> who reports 9 cases treated by this remedy with great success. Nauwelaers<sup>276</sup> regards it as a specific, but considers it a dangerous drug to handle,—analogous to chloroform; it acts powerfully upon the nerve-centres, and it is best to commence with a small dose, gradually increasing. It may be administered in coffee. Its action is that of an antispasmodic, not a germicide. In an interesting discussion before the Chicago Medical Society, Earle<sup>115</sup> reported 8 or 10 cases of pertussis, which he had treated with bromoform with good results. Schippers<sup>583</sup> furnishes further proof of its value in the following doses: Children 6 months to 1 year old, 2 minims (0.13 gramme), three times daily; from 1 to 2 years old, 3 minims (0.19 gramme); from 2 to 3, 4 minims (0.26 gramme); from 3 to 4, 5 minims (0.32 gramme); and from 4 to 7, 6 to 7 minims (0.39 to 0.45 gramme) may be given in a spoonful of syrup. For adults the dose is 0.5 to 0.8, in capsules. Bromoform should always be kept in the dark and out of the reach of children. Ouabaine has been recommended by English physicians, and Porteous,<sup>1</sup> of Yonkers, imported some of the drug and administered it with marked effect in 3 cases;  $\frac{1}{1000}$  grain (0.000065 gramme) is the dose for a child under 5 years, administered every three hours.

Ungar<sup>69</sup> again calls the attention of the profession to the efficacy of quinine in this disease. He administers the drug twice daily, in doses of as many centigrammes as the child is years old, with the effect of ameliorating the violence of the attacks, shortening the course of the disease, and preventing complications. Chavernac<sup>67</sup> advises the sublimation of naphthalin, 15 to 20 grammes ( $3\frac{5}{8}$  to  $5\frac{1}{4}$  drachms), in the patient's room. The general sentiment is against the use of phenacetin,—the effect being, as a rule, too depressing,—but it still has its advocates. Zane<sup>102</sup> gives  $\frac{1}{2}$  to 2 grains (0.032 to 0.13 gramme), every two, four, or six hours, according to age and urgency of symptoms, with good results. The vapor of iodoform has been employed by Chibret,<sup>35</sup> who sprinkled the room of the patient with iodoform. The paroxysms are said to be thereby lessened in frequency and violence. Hellet<sup>118</sup> has treated 4 cases with inhalations of ozone with good effect. Braro<sup>578</sup> says that the essential oil of cypress is the most successful remedy he has ever used for this disease. It is employed by dropping some on the patient's pillow and on the

clothes, near the collar, so that it may be constantly inhaled. Beltz<sup>366</sup><sub>B.32,H.1,2</sub> treats the nasal catarrh which accompanies pertussis by insufflations of nitrate of silver daily or every other day, with the result of favorably influencing the paroxysm of coughing.

*Complications and Sequelæ.*—A case of whooping-cough, complicated by broncho-pneumonia and convulsions, is reported by Leroux.<sup>152</sup><sub>Jan.9</sub> Baumel<sup>118</sup><sub>Jan.</sub> reports a case of very severe whooping-cough complicated by convulsions and syncope. Catarrhal nephritis has been observed, in a case following whooping-cough, by Mettenheimer.<sup>366</sup><sub>July 20</sub> Emphysema as a complication is very rare, and almost always fatal. Pernet<sup>33</sup><sub>Apr.</sub> also reports a case. Two cases of bilateral loss of sight, of brief duration, occurring with pertussis are reported by G. W. Jacoby,<sup>1</sup><sub>Feb.28</sub> and ascribed by the observer to cerebral œdema.

#### PAROTITIS.

*Etiology.*—Duplay,<sup>3</sup><sub>Jan.14</sub> in presenting a case of parotitis complicating pneumonia, advanced the theory that it was caused by an invasion of Stenon's duct by the pneumococci, which rapidly increased and caused an inflammation of the parotid. This is always a grave form of the disease, almost always suppurating, and the prognosis is bad.

*Treatment.*—Hagopoff's treatment is as follows<sup>100</sup><sub>Sept.8</sub>: Envelop the affected part in wadding, put the patient to bed, and, if an adult male, apply a suspensory; the medicinal treatment consists of purgatives (castor-oil, Hunyadi water, etc.), diuretics, and, above all, diaphoretics (the infusion of jaborandi is preferable, because it is eliminated by the salivary glands, and, thanks to the activity of the excretory work, hastens the elimination of the micro-organisms). If orchitis appears, envelop the testicles in soft cotton and elevate them toward the abdomen.

*Sequelæ.*—A case of mumps followed by meningitis has been reported at length by G. H. Doudney.<sup>6</sup><sub>Nov.29</sub> It occurred during the prevalence of a rather severe epidemic in Lincolnshire, chiefly remarkable for the number of adult sufferers, several of the males—in fact a majority—suffering from orchitis. Liégeois<sup>73</sup><sub>Oct.3</sub> relates 3 cases of parotitis accompanied by cerebral and meningeal congestion and orchitis, 1 case resulting fatally. It has been observed by Felsenthal<sup>158</sup><sub>B.14,H.1,2</sub> that the submaxillary glands are frequently swollen and inflamed coincidently with affection of the parotids. F. M. W.

# RHEUMATISM AND GOUT.

By N. S. DAVIS, M.D., LL.D.,

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## ACUTE AND CHRONIC RHEUMATISM.

*Etiology.*—Facts illustrating the influence of age, season of the year, and meteorological conditions, in determining the attacks of rheumatism in its different forms, have been reported by several writers. B. W. Munson, Superintendent of the Connecticut Soldiers' Hospital, <sup>2002</sup><sub>p.211</sub> states that, of 447 veteran soldiers registered in that institution June 30, 1890, 142, or 29 per cent., had been admitted on account of some form of rheumatism. They were tabulated under the following heads:—

Cardiac disease due to acute attacks, . . . . .	14
Subacute rheumatism, . . . . .	9
Arthritis deformans, . . . . .	12
Chronic rheumatism, . . . . .	101
Lumbago, . . . . .	6

142

All the acute rheumatic attacks that had resulted in the 14 cases of cardiac disease were attributed to prolonged exertion, exposure to protracted cold and wet when on duty, and when the subjects were between the ages of 18 and 25 years.

McPhedran, <sup>39</sup><sub>June 16</sub> in a paper read to the Ontario Medical Association, June 3d, says that rheumatic cardiac affections are most frequent in childhood and diminish in proportion as age increases, and cites the following table in proof of the statement:—

- Of cases occurring between 1 and 10 years, 83 per cent. have heart lesions.
- Of cases occurring between 10 and 20 years, 69 per cent. have heart lesions.
- Of cases occurring between 20 and 30 years, 51 per cent. have heart lesions.
- Of cases occurring between 30 and 40 years, 30 per cent. have heart lesions.
- Of cases occurring between 40 and 50 years, 21 per cent. have heart lesions.

Harvey J. Chadwick, <sup>202</sup><sub>Sept.10</sub> in a paper read to the Michigan State Medical Society, says that neither cold, nor heat, nor dampness, acting separately, will produce rheumatism. His theory is

that the disintegration of fibrous tissues by protracted exercise increases the formation of lactic acid in the blood and increases heat, and then, if exposed to rapid reduction of temperature, rheumatic inflammation ensues. Hence, he declares his "firm conviction that rheumatism is caused by heating the body, or portions of it, by excessive movements or exertion, and then suddenly bringing on contraction of the parts affected by rapid reduction of temperature." Waibel <sup>34</sup><sub>Feb. 3</sub> reports the result of a careful etiological study of 121 cases of acute articular rheumatism, under his own care, between 1874 and 1889. Of the 121 cases, 38 occurred during the three winter months, 32 in the spring, 24 in summer, and 27 in autumn. The highest number in one month was 19, in January; the next, 18, in March; and the lowest number was 5, in September. Seventy-four of his patients were subject to hard labor, while 47 were not overworked. Prinzing <sup>133</sup><sub>June 25</sub> gives an analysis of the etiology of rheumatism at Ulm, as it occurred in both civil and military life; but his tables would occupy more space than is allotted for that purpose.

A. Haig, whose valuable investigations concerning the influence of uric acid as the efficient cause of gout were noticed in the ANNUAL for 1890 and 1891, has more recently <sup>15</sup><sub>Feb. to Apr.</sub> presented a lengthy paper, in which he adduces many facts and much plausible reasoning to show that this agent equally exerts an active and efficient influence in the production of acute articular rheumatism. He condenses his views in the following paragraphs:—

"1. That any diminution of the alkalinity of the blood and tissue-fluids in a given region of the body causes the uric acid coming to it in the blood to become less soluble and more easily retained; in other words, causes it to remain in the fluids of the less alkaline region, instead of passing on in the circulating blood. The blood thus becomes poorer, and the region of diminished alkalinity richer in uric acid or biurate.

"2. According to Sir A. Garrod, certain regions and tissues, as the liver, spleen, and the cartilages and fibrous tissues of joints, are normally less alkaline than the other tissues of the body and their fluids; hence, in any general diminution of alkalinity, these tissues will be most affected, and the circulating uric acid will first of all be rendered insoluble or retained in them.

"3. It follows, from what has been said, that the uric acid, or

biurate, thus concentrated or precipitated in certain tissues, gives rise to irritation going on to inflammation, which is roughly proportional to the amount of uric acid concentrated in any given spot, and the time during which it can act upon the tissues. It may be noted, in passing, that when any tissue or organ is thus collecting and retaining, so to speak, all the uric acid that comes to it in the blood-stream, and while the local pains in the tissues concerned are increasing, the blood grows poorer in the uric acid, and, as a consequence of this, the amount excreted in the urine diminishes, so that we have an independent source of evidence as to what is going on. Conversely, when an alkali or other solvent of uric acid has been introduced into the circulation, the process is reversed; the blood passing through the irritated tissue now takes up in solution the uric acid that was previously retained or deposited; the affected organ or tissue grows poorer in uric acid, while the blood grows richer; and, as an evidence of this latter change, there is an increased excretion of uric acid in the urine." <sup>15</sup> Mar.

By assuming that the chief predisposing causes of rheumatism diminish the alkalinity of the blood, or of the fluids of local tissues, Haig, in the foregoing propositions, plausibly explains how the uric acid, rendered less soluble, is attracted to and made to accumulate in the tissues sufficient to cause pains and rheumatic inflammation, while the blood in general circulation and the urine would yield less than natural, when subjected to the usual tests.

*Microbes.*—Bouchard, with Charrin, <sup>3</sup> Sept. 22 has been investigating the causes of rheumatism by microscopic examination of the fluids and structures of the affected articulations, chiefly in sub-acute and chronic cases. Ten cases were examined, in 6 of which the staphylococcus albus existed alone, in 1 it was associated with the staphylococcus aureus, and in the other 3 some new bacilli were found. These bacilli were cultivated on agar-agar or gelatin, and also under sterilized oil. Experiments were made on animals by intra-venous inoculations, by which symptoms resembling both articular and muscular rheumatism were slowly induced, the time varying from eleven to sixty days.

A majority of the inoculations were made with the bacillus pyocyaneus, although the staphylococcus albus was the one much the most frequently found in the rheumatic articulations.

*Pathology and Pathological Anatomy.*—The condition of the

blood in acute articular rheumatism has been studied in 15 patients by Maragliano.<sup>505</sup><sub>Mar. 22</sub> His conclusions are given<sup>1</sup><sub>May 2</sub> as follows: "1. The rheumatic infection is characterized by a profound alteration of the red corpuscles. 2. This alteration affects both the central mass and the periphery of the corpuscle, and is of two kinds,—chromatic and morphological. 3. There is oligocythæmia. 4. There is no real leucocytosis. The relation between the white and the red corpuscles being modified by the destruction of the latter, there is an apparent increase of the leucocytes. 5. The destruction of the red corpuscles was proved by numerous examinations made throughout the course of the disease. In all of the examinations the number of the white corpuscles remained almost unchanged, while that of the red globules diminished perceptibly with the progress of the malady. 6. The alteration is proportionate to the duration of the infection, the height of the temperature, and to the general condition of the patient. 7. If the heart is affected, the changes in the blood incident to that complication are to be added to those caused by the rheumatism. 8. The restoration of the red corpuscles, when the disease has ended, is very slow and uncertain." Georges Lemoine<sup>55</sup><sub>Mar., Apr.</sub> gives an interesting series of articles on the relations of rheumatic arthritis with the neuroses. While he presents many facts illustrating the nervous symptoms and mental conditions common in rheumatic and gouty patients, and those affected with many well-recognized nervous and mental diseases, he does not increase our knowledge of the pathological processes involved. Wichmann<sup>319</sup><sub>Nov. 12</sub> has also endeavored to show that the nervous symptoms occurring in chronic articular rheumatism depend upon the involvement of the spinal cord,—not as reflex or secondary, but as a primary seat of the disease. In proof of this, he cites the large number of symmetrical affections that occur in chronic rheumatic cases, such as corresponding areas of erythema, hygromata of the bursæ mucosæ, phalangeal nodes, and the well-known symmetrical occurrence of the joint affections. He thinks Charcot's hypothesis that the irritation commences in the articulations, and is reflected through the nerves to the spinal cord and radiated from them to the muscles, inducing contractures or atrophy, is not tenable; particularly, as it fails to explain the occurrence of extensor contractures or the twisting of the terminal phalanges of the fingers toward the radial side, as they are seen in chronic rheu-

matism. G. Wallace Anderson <sup>213</sup><sub>Mar.</sub> presented to the Medical Society a case of rheumatoid arthritis, accompanied by many subcutaneous nodules on different parts of the body. The patient, a female, aged 50 years, had suffered from "rheumatic pains" for fifteen years, and the nodules had existed more than ten years. The latter were all on the extensor surfaces, and were freely movable under the skin. The most prominent nodules were a large one over each olecranon process and a little smaller one over each patella. The joint affections in the case corresponded fully with Garrod's description of rheumatoid arthritis, and if, as claimed by both Garrod and Cheadle, the nodules are solely rheumatic, there can be no absolute difference between the rheumatoid arthritis and chronic rheumatism. Middleton said "there were various classes of cases showing these nodules: in one class the nodules were permanent or persisted for many years, and were painful; in another class the nodules were painless, and of brief duration (weeks or months). The latter class seemed more common in childhood, and was apparently more apt to be associated with endocardial disease." Barlow remarked that the distribution of the nodules in Anderson's case suggested a connection with the lymphatic system of vessels.

Angel Money <sup>6</sup><sub>Mar.7</sub> says that, "At a recent necropsy on a woman aged 20, fairly recent adhesions obliterated the whole pericardial sac, and nothing very nodular about the pericarditis could be detected; but, on peeling off all the pericardial lymph, at least three subpericardial nodules were found, each of the size of a small hempseed; the pericardial endothelium appeared to be intact over them, and they had made a place for themselves in the surface myocardium. These are, I suggest, the true homologues of subcutaneous nodules, and ought to be called subpericardial. The nodular endocarditis is to be compared to nodular pericarditis, pleurisy, and perihepatitis." Again, he says: "Subcutaneous nodules and acute rheumatic polyarthritis are seldom found together. Generally the rheumatism is of subacute and subchronic intensity and duration when nodules appear. The more smoldering the lesion, the more liability is there to subcutaneous and subcapsular and subserous nodules to form. It is rather rare, in my experience, to find crops of nodules coming and going with rapidity, *i.e.*, in the course of a few days. Their relation to chronicity is further testified by the usual absence of tenderness, of pain, and of fever."

I. E. Atkinson,<sup>99</sup><sub>Oct. 15</sub> in a paper read to the Association of American Physicians, September 23, 1891, on bradycardia, or unnatural slowness of cardiac pulsation, as connected with acute articular rheumatism, closed with the following conclusions: "1. Bradycardia is observed rarely during the active stage of acute inflammatory rheumatism; it occurs with greater frequency during convalescence from this disease. 2. When it occurs during convalescence, in most cases, probably, it is identical with bradycardia, following acute febrile diseases of widely different nature, and directly the result of the febrile action itself upon the innervation or musculature of the heart. 3. When it occurs during the active stage of the rheumatic fever, it probably depends upon endocarditis, or pericarditis, or myocarditis (primary or secondary by extension), whereby the inhibitory nerves of the heart are implicated and consequently stimulated; even where the physical signs of cardiac inflammation are absent, bradycardia occurring during the acute stage of rheumatism may be secondary to undetected myocarditis stimulating the vagus nerve. 4. It is possible, but exceedingly improbable, that this symptom may follow the action of the rheumatic *noxa* upon the cardiac muscle or nervous system directly." In the discussion that followed the reading of the paper, Ord, of London, said that for many years he had thought it probable that the pneumogastric nerve itself plays an important part in the phenomena of acute rheumatism.

E. A. Wood<sup>663</sup><sub>Jan.</sub> suggests that many cases of transient fever, with articular and muscular pains and visceral derangements, are being classed with rheumatism that depend upon ptomaines, and should be differentiated from true rheumatism.

John S. Marshall<sup>61</sup><sub>Oct. 17</sub> read an interesting paper in the Section of Oral and Dental Surgery of the American Medical Association, on the rheumatic and gouty diathesis as manifested in diseases of the peridental membrane, in which he gave the results of much clinical observation, tending to establish the fact that tenderness, pain, and thickening of the peridental membrane were often dependent upon a general rheumatic or gouty condition of the patient, and were to be permanently relieved only by proper treatment of that constitutional condition.

Galippe<sup>789</sup>; <sup>6</sup><sub>Oct. 24</sub> published a case of acute rheumatism in the temporo-maxillary joint, in which the upper and lower wisdom-

teeth on the same side felt as if raised in their sockets. He considers this as due to an attack of rheumatism in the alveolar dental membrane, or rheumatic periodontitis, and not an extension of pain from the affected joint.

*Treatment.*—The medical periodical literature of the past year has presented very little that is new or valuable regarding the treatment of the various grades of rheumatism. The salicylates and alkaline salts, aided by salol, phenacetin, etc., continue to hold the leading place in the treatment of acute and subacute cases. A. Haig, in his more recent paper, insists more strongly on the advantages of adhering to a vegetable and milk diet, to the exclusion of butchers' meat. Three fairly well characterized cases of hyperpyrexia in acute rheumatism have been reported as successfully treated by the cold bath and cold pack. One of these is related by A. Robertson, of Glasgow.<sup>6</sup><sub>Oct. 24</sub> His patient was immersed in the bath at 90° F. (32.2° C.), which was rapidly reduced to 71° F. (21.7° C.), and continued twenty minutes, during which the patient's temperature fell from 106.8° F. (41.6° C.) to 101.4° F. (38.5° C.), after which the patient made a good recovery. The other 2 cases are reported by J. Gillies.<sup>257</sup><sub>Jan.</sub> He used the cold pack, and repeated it several times, with excellent results. H. C. Male<sup>15</sup><sub>May</sub> has given an interesting summary of the cases of rheumatic hyperpyrexia treated by the cold bath or cold pack, and strongly recommends the practice.

Rosenthal<sup>9</sup><sub>July 11</sub> relates a case of rheumatic hyperpyrexia that died at the temperature of 111.6° F. (44.3° C.) without either delirium or coma.

A. L. Gillespie<sup>22</sup><sub>June 17</sub> relates 4 cases of acute articular rheumatism, in which the pain was speedily relieved by the hypodermatic injection of from 5 to 10 minims (0.32 to 0.65 gramme) of a 10-per-cent. solution of carbolic acid, the injection being made in the subcutaneous tissue in direct proximity to the inflamed structures. Joseph Lane Hancock<sup>779</sup><sub>Sept.</sub> claims to have obtained the same speedy relief from pain by wrapping the acutely-affected articulations in cloth, wet in a warm 4-per-cent. solution of carbolic acid. E. V. Bekhten, of St. Petersburg,<sup>2</sup><sub>Suppl., Aug. 8</sub> reports having used, with excellent results, an "infuso-decoction" of the *Ephedra vulgaris* (Steppe raspberry) in 16 cases, 4 of whom were suffering with acute articular rheumatism, 2 with chronic, and 2 had acute and 6

chronic muscular rheumatism, 1 rheumatic sciatica, and 1 rheumatic osteomyelitis. The infusion was prepared by putting 4 grammes (1 drachm) of the powdered leaves, stems, and roots of the plant into 192 cubic centimetres (6 ounces) of boiling water, of which 15 cubic centimetres ( $\frac{1}{2}$  ounce) were given every two hours.

J. Morton, of Mussoorie, <sup>239</sup><sub>Mar.</sub> relates a severe and protracted case of chronic articular rheumatism, in a lady aged 61 years, that was fully cured by the use of cactus, known as *Sheckwar*. A jelly was prepared by taking twelve leaves, scraping off the epidermis, weighing the pulpy part left, and adding half its weight of sugar. This was kept over a slow fire until it assumed the consistence of a thin jelly, and then kept in a jar. The patient took one teaspoonful of this each morning and afternoon for ten days, when the dose was increased to a dessertspoonful and continued a week longer. The relief of the patient was so complete and permanent that Morton asks the profession to give cactus further investigation.

Regarding the treatment of gonorrhœal rheumatism, Julien <sup>3</sup><sub>May 16</sub> says that for the last five years he has systematically treated it with subcutaneous injections of bichloride of mercury, with extremely satisfactory results. E. Bessier <sup>3</sup><sub>May 16</sub> said he placed most reliance on the method recommended by Lucas-Championnière, consisting in touching several points with the cautery, then wrapping the joints in Vigo's mercurial plaster, with cotton-wool dressing subsequently.

A. Hennig <sup>69</sup><sub>Aug. 2</sub> discusses the value of salipyrin, and recommends it in all rheumatic affections as efficient and without collateral disagreeable effects. It is described as a white, coarsely crystalline powder, in 100 parts of which 57.7 are antipyrin and 42.3 salicylic acid. The doses he used varied from 1 to 6 grammes (15 grains to 1½ drachms).

#### GOUT.

*Etiology.*—Cammerer <sup>69</sup><sub>Mar. 5, 12</sub> discusses, at considerable length, the etiological relation of uric acid to gout. Instead of regarding the uric acid as one stage in the retrograde process of urea formation, he recognizes it as an independent nitrogenous product from the albuminous elements of the tissues, and endeavors to show that it is produced in the liver, instead of the kidneys. He claims its formula to be  $C_5H_4N_4O_3$ , and that it is extremely insoluble. The

amount present in the blood is always small, being, in healthy persons, only in the ratio of 2.8 to 100 of urea; in persons affected with gout, an average of 3.1 to 100. Cammerer prefers the silver test, and claims that by it the presence of a thousandth of 1 per cent. can be detected. His observations would rather confirm the position of A. Haig, that persons affected with acute gout store the uric acid or urate of soda in the tissues, leaving less in the circulating blood; and, when it does appear in the latter above the normal ratio, it is due to diminished secretion by natural processes.

*Diagnosis.*—In the ANNUAL for 1891, “Pfeiffer’s Test for Latent Gout” and the criticisms or comments thereon by Sir William Roberts were stated. To the latter, Emil Pfeiffer<sup>Jan. 3</sup> replies by a full restatement of his views, and claims that, inasmuch as the experiments of Roberts were made with the urine of healthy persons, in which the uric acid differs in readiness of separation from that of persons affected with gout, his results were not applicable. He says: “It is only the great proneness of the urine of persons subject to gout to part with its



FIG. 1.—GOUTY FINGERS.  
(*Lancet.*)



FIG. 2.—GOUTY FINGERS.  
(*Lancet.*)

uric acid, which is characteristic of that disorder, and not the mere abstraction itself. While from 100 cubic centimetres ( $3\frac{3}{8}$  ounces) of the urine of healthy persons the uric acid is only

abstracted by 2.0 or 3.0 grammes (30 to 45 grains) of uric acid, from the urine of gouty persons it is withdrawn by 0.2 or 0.5 gramme (3 to  $7\frac{1}{2}$  grains).

Emil Pfeiffer<sup>6</sup><sub>Apr. 11</sub> also furnishes an interesting article on the history and diagnosis of digital nodes as they appear in gouty and rheu-



FIG. 3.—GOUTY FINGERS.  
(*Lancet.*)

matic subjects. From the time of William Heberden to the present, the majority of writers have regarded his “de nodis digitorum” as of exclusively rheumatic origin. But Pfeiffer and some others have shown that the finger-nodes are divisible into two classes. In one class the nodosities are true osseous enlargements, and are

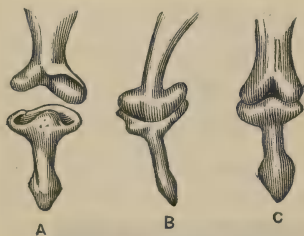


FIG. 4.—GOUTY FINGERS.

*a* represents the phalanges from the back, and *b* the side view. For purposes of comparison he gives a delineation of the dorsal surface of a normal phalangeal joint, shown in *c*.

(*Lancet.*)

of rheumatic origin; in the other class the nodes are composed of urate-of-soda deposits, and are connected with the true gouty diathesis. The outward appearances are illustrated by the accompanying cuts (Figs. 1 to 3), while the osseous enlargement of the ends of the bones in the rheumatoid cases is seen in Fig. 4.

In connection with gouty finger-nodes, G. Linden<sup>107</sup><sub>Oct.</sub> mentions 2 cases in which “the nails of the big toes are more or less raised, through the increase of the epidermical cellular layer under the origin of the nail, and their free edge is somewhat bent downward. The interior and posterior parts alone remain flat on their beds. At the same time, an inspissation manifests itself from the anterior end of the matrix to the free end.” On scraping out some of the accumulated material, he found it to contain crystals of urate of soda. Both patients were subject to plain attacks of the gout.

# DISEASES OF THE KIDNEYS BLADDER AND SUPRA-RENAL CAPSULES.

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## DISEASES OF THE KIDNEYS.

*Physiology of the Kidneys.*—M. O. Van der Stricht<sup>3</sup><sub>May 6</sub> comes to the following conclusions as to the mechanism of the urinary secretion: As was first suggested by Lorenz, the membrane covering the internal surface of the secretory cells of the kidney may be considered as a true protective organ for the purpose of keeping from the protoplasm of the cells any substances which might interfere with their functions. The structure of this cuticle varies very much according to the degree of functional activity of the epithelium. In conditions of complete repose, as in the kidney of a bat during the period of hibernation, it is homogeneous; in conditions of activity it is marked by one or more clear streaks through it, and where these are at all numerous the appearance is given of a structure formed of a number of small rods separated by a clear, liquid, intermediate substance. Often, too, it is divided into a number of fragments, which look as though they were floated out upon the liquid collected within the cellular protoplasm. After especial functional excitation the membrane seems to be detached and pushed away from the protoplasm by the urine collected within the cell. The products of the renal secretion collect within the epithelial cells in the form of liquid masses, of elongated or rounded appearance, and clear like the contents of the tubules. This liquid finds its way into the tubules through openings of greater or less size in the limiting membrane, sometimes breaks through the latter to gain the interior of the canaliculi, and occasionally detach and carry it away. \*

## BRIGHT'S DISEASE.

*Etiology.*—Within the past year one of the most notable contributions to the literature of this disease has been that of Man-

(L-1)

naberg<sup>114</sup><sub>B.18,H.3,4; Feb., May; Apr.</sub><sup>90</sup><sup>112</sup> upon the relation of acute nephritis and the streptococci found in endocarditis, especially those of experimentally induced bacterial endocarditis. In 11 cases of acute Bright's disease the urine was found to invariably contain streptococci, which disappeared from the excretion with the disappearance of the symptoms of disease. In patients affected by other maladies and in healthy individuals this micro-organism was not found, although searched for in a long series of samples of urine. Man-naberg has been able to cultivate the streptococcus in question, and to separate it, by peculiarities noted in its cultivation, from other varieties of streptococci. When inoculated into dogs and puppies, even in relatively small quantities, an intense renal inflammation followed, and in the puppies an ulcerative endocarditis ensued as well. The cocci do not appear to select the kidneys as an especial position for growth, but probably multiply in the blood and tissues generally; in their escape through the renal structures, however, they produce their serious consequences. The author looks upon these micro-organisms as the etiological factor in the cases in question, and states that cases belonging to this category appear to generally run a brief, but often severe course, one which, as a rule, however, terminates favorably. Briefly, the writer here is evidently dealing with a form of blood-poisoning with especial involvement of the kidneys. The older views as to the origin of Bright's disease from such causes as exposure to cold and dampness are constantly being more and more restricted, and there are constantly being added factors of causation which have previously scarcely been conjectured. That a renal inflammation should arise as the consequence of the excretion of the bacterial products in the various infectious diseases, or of the bacteria themselves, is a natural outcome of the increase of our knowledge of the relation of the animal tissues and functions to micro-organisms. But it is an advance in our study of etiology that such a micro-organismal factor should be described as exerting its most prominent pathological influences upon the kidneys, although such an announcement has been confidently expected by the farsighted of the profession and has been clearly foreshadowed by the trend of study of previous years. This much is, however, probably true, that as long as our knowledge of the histology of the renal organs makes no more advances than in recent years, there will be little or no

differentiation, save as may arise from the history of the case and extended bacteriological research in each instance, between the forms of nephritis arising from one or the other micro-organism.

Illustration of this assertion is immediate in the publication of Letzerich <sup>114</sup> of an acute bacillary nephritis. From 1880 to 1889, especially in 1882, he observed a number of cases of renal inflammation due to a characteristic bacillus, from cultures of which he has been able to reproduce the nephritis in rabbits. The symptoms are in general similar to those in other cases of nephritis, but usually are of a mild form, and are apt to show a predominance of the gastric phenomena. The spleen is apt to be swollen, and considerable fever, with an often rapidly-developing œdema and effusion into the serous cavities, is not an unfrequent feature. The urine is found to contain numerous short, straight, or curved rods, which may be demonstrated by taking a bit of the sediment and rubbing it between two cover-glasses, dried in the air, or in contact with an apparatus containing calcium chloride, the drying completed by passing the separated covers through the spirit-flame cautiously, then staining the smeared surface of the cover with a concentrated, watery solution of methyl-blue, and finally mounting the preparation, after drying, in Canada balsam. The affection was met with mostly among children; and, in the cases which came to post-mortem section, it was found that the bacilli develop only in the interstitial structures of the kidney, although the spores may be present generally throughout the body. The author admits the possibility of this bacillary affection becoming chronic.

As an illustration of those cases referred to above, where there is a total absence of apparent causation of an acute Bright's disease, by exposure and the possible existence of an infectious etiological factor, may be mentioned the case detailed by Stockton, of Buffalo. <sup>19</sup> In this case, a man of 42 years of age, general health <sub>May 9</sub> previously quite good apart from the diseases of childhood, a sudden chill ushered in the affection, followed by pains in the abdomen, diarrhœa, a second chill several days later, evidences of inflammatory changes of a catarrhal nature in the lungs, resistant pulse (considering the prostrated condition of the man), slightly blunted sensibility and perception, and a urine loaded with albumen and full of blood-casts from the renal tubules. Tongue brown and dry; the general condition one of a low, typhoid character

(see also in section on pathology). In such a case as this, without any history of wetting or any exposure to cold—the classical causes of acute nephritis—the suggestion of a micro-organismal origin is exceedingly relevant; and a consideration of the manner of onset, the involvement of the lungs, the prostration, cannot fail to strengthen the suggestion. The investigations of Mannaberg and Letzerich have probably led to results eventually to be accepted and demanding attention in relation to every acute case of renal inflammation where the ordinary etiological factors are at fault or are absent.

To be separated from the above, as cases of an essentially secondary origin, but in reality arising in precisely the same manner, are those cases of acute Bright's disease occurring in the course of or after the termination of the infectious diseases. Referring to the relative prominence of exposure and the influence of the infectious diseases upon the production of both the acute and chronic forms of renal disease, M. Vignerot<sup>360</sup><sub>Oct., Oct. 17</sub> says that the tendency even now is to attribute too large a share to cold in the causation of nephritis. Taking the infective diseases alone, the alterations brought about by the micro-organisms in the renal tissue may pass away without leaving any trace, but they may also become chronic, causing changes in the epithelial elements and interstitial proliferation. Scarlet fever holds the first place among the infectious diseases in this relation; then variola, measles, enteric fever, and diphtheria. Pneumonia, erysipelas, rheumatism, infectious tonsillitis, and cholera have been mentioned, and the author mentions a case following mumps. Tuberculosis, syphilis, and malaria are also to be placed in the same list. Vignerot refers to a case in which, after scarlet fever, exposure to the least cold produced a decided increase in a scarcely perceptible albuminuria. It seems possible that in the establishment of actual inflammation cold can lower the resistive power of the tissues to the action of the bacteria of these infectious diseases or their products, but could scarcely, by the simple and brief congestion which it induces, reflexly produce a real nephritis. So, in cases already established, cold may give an impulse to the morbid condition, just as if a nephritis had been induced by some one infectious disease, and under the influence of another and subsequent infection becomes intensified. An exceedingly valuable comparative paper upon the etiology of Bright's disease is published by Agnes Blum,<sup>326</sup><sub>B. 17, H. 3, 4; Feb.</sub>

based upon an analysis of 8442 cases, the material derived from Eichhorst's clinic during a period of five and one-half years. Among these, 270 were cases of Bright's disease, 483 simple albuminuria. Mechanical congestion and amyloid disease were not taken into account. Nephritis occurred more frequently in males than in females (3.309 to 2.74); it was most common during the period of greatest activity of the body. Of the 270 cases, 140 were acute, 85 being hæmorrhagic. Of these 140 cases of acute Bright's disease, 70 per cent. could be traced to acute infectious diseases; only 2.85 per cent. being directly traceable to cold, and only 6.42 per cent. classed as of "unknown or uncertain origin." Of 873 cases of enteric fever, Bright's disease occurred in 31 and albuminuria in 143. Among 97 cases of scarlet fever, but 4 exhibited the symptoms of Bright's disease. Of 45 cases of measles, but 1 evinced renal involvement. In 162 cases of erysipelas, Bright's disease occurred 7 times and simple albuminuria 17 times. Among 481 cases of variola it appeared but once,—in a child 12 months old. In 93 cases of diphtheria it occurred but 4 times and simple albuminuria but 6 times. Of 74 cases of tonsillar angina, 4 cases presented evidence of nephritis, 20 were albuminuric. Among 10 cases of ulcerative endocarditis it occurred once. Out of 360 cases of acute rheumatism, but 4 were affected secondarily by acute Bright's disease. Acute nephritis is not rare in acute pneumonia, occurring in 26 out of 140 cases; it is rather rare in simple acute pleurisy and in simple peritonitis. It was also rare in relation to acute miliary tuberculosis; rather common (8 times out of 12 cases) in pyæmia. It was met also in connection with chronic tuberculosis and constitutional syphilis. Besides these, a number of less important factors are named as occurring occasionally among the remainder of the acute cases. From the observations made by the author in the study of these cases, it would appear that the severity of the primary disease has little to do with the severity of the nephritis, the course of the former and that of the latter usually being without mutual influence.

Fiessinger, of Oyonnax, <sup>55</sup><sub>Oct. 10</sub> places upon record the history of an epidemic of scarlatina and of Bright's disease which occurred in that and surrounding villages, his article being supplementary to the one noted in last year's edition of this review. It will be remembered that his first observation of anything suggesting

epidemicity in Bright's disease included 4 cases occurring in the hamlet of Geovresset, containing 134 inhabitants. In Martignat, a village of about 550 inhabitants, 14 cases were attacked at the same time. In neither of these two villages had the *la grippe* appeared at the time of the nephritic outbreak, and no result from scarlet fever occurred until some time later. From Martignat the disease passed to a village upon a neighboring mountain—Apremont—having an elevation of nine hundred metres. No communication had taken place between the sick of Martignat and those who became affected at Apremont, nor between the latter and the scarlatinous cases which were then present in Oyonnax. Within a period of two months Fiessinger was consulted by 4 persons from Apremont for the relief of symptoms of acute nephritis: a woman of 47 years of age, a man of 44 years, another man of 30 years, and a young girl of 18 years. At the same time and in the same place 2 other young persons, of about 18 years of age, presented œdema of the face, but recovered without treatment. Following the road from Apremont to Oyonnax, between these two villages, is a small hamlet,—Geilles. Here a man of 50 years was taken ill with the symptoms of Bright's disease, of a rather severe, acute form, at about the same time that it was last seen at Apremont. The man was cured, but, curiously, several months later, his little daughter, aged 10 years, contracted the same disease. But two kilometres separate Geilles from Oyonnax. While at Geovresset Bright's disease was apparently unassociated with scarlatina, and so, too, at Martignat, Apremont, and Geilles, there were cases of scarlet fever at places a few kilometres distant, in Oyonnax,—where the two diseases were found together. Oyonnax is a town of 4400 inhabitants, and, as physician to several beneficial societies, Fiessinger was in a position to meet most of the cases of illness in the place. From March to October of 1890 he treated in this locality 18 cases of clear and well-marked scarlatina, the source of the primary infection being unrecognized. Of these 18 cases, most of which were among children, 4 became nephritic during their convalescence, cold as a factor being quite eliminated. In 2 of these the children affected with the renal complication were in the same room, and, as an important fact, it may be added that the sister of these children, who had been sent to another village to avoid the scarlatinal contagion, on her

return was seized with a nephritis, without presenting any symptoms of scarlatina, from which her sisters were convalescing. Side by side in this town with the clearly-cut cases of scarlet fever were to be met cases of more or less severe forms of angina, a number of cases of Bright's disease, and the class of symptoms designated by Trousseau as pseudo-scarlatinal. As at Martignat, persons of every age were affected among the 18 cases collected, which, having had no eruption upon the skin during the course of the illness, are not looked upon as scarlatinal, the ages of the patients ranging from  $3\frac{1}{2}$  years to 66 years. The author points out that, from the statistics he has collected, it appears that the adults are more often the subjects of the nephritic manifestations, while children more frequently manifest the ordinary symptomatology of scarlet fever. In all, Fiessinger met in the epidemic which passed over these neighboring towns 42 cases of acute nephritis occurring in persons apparently not affected by the scarlatina and 18 cases of undoubted scarlatina. The nephritis preceded the scarlatina at Oyonnax and appeared without it at the other towns; the cases of Bright's disease were more numerous than those of scarlatina. Considering all these points, Fiessinger would regard the two affections as distinct, but subject to the same epidemiologic conditions of origin, which are complete, however, in but a proportion of cases. He concludes that Bright's disease may be epidemic and occur as such apart from scarlatina; that it may also occur with scarlet fever under the same forms as when epidemic without the latter; that in the same epidemic all the forms of nephritis may occur, from the acute to chronic; that between the chronic epidemic form and the common chronic variety there are no differences of symptoms or course; that the epidemic form, when uncared for, is apt to become chronic just as the ordinary acute Bright's disease. In this connection one cannot help thinking that it would be quite as reasonable to look upon these varied phenomena as in reality but the varied manifestations of one and the same infection, although, of course, the possibility of a combined infection cannot be absolutely denied. Inasmuch, however, as in mild epidemics of scarlet fever there are always a number of anomalous cases with no eruption whatever, or an eruption so slight and transient as to easily escape observation, and as the proportion of such anomalous instances seems to follow some unknown influence of place, it

seems probable to me that these instances of Fiessinger's are really secondary to a scarlatinal infection rather than to a primary infection of their own.

Continuing the subject of these secondarily infectious cases of Bright's disease, mention must be made of the instances, occurring in 2 children in the course of rheumatic purpura, met by Mous-sous.<sup>118 32</sup> Both cases were characterized by articular pains, hæmorrhages beneath the skin and from the mucous membrane of the alimentary canal, pains in the back, œdema, occasional hæmaturia, continuous albuminuria, and in one the presence of casts, hyaline and epithelial. One child died from asthenia. At section there was found a thickening of the mitral valve, which, probably, antedated the attack. The kidneys were of a yellowish-white appearance, and had the general appearances of the large white kidney, except that they were not much enlarged. Microscopical examination showed that they were the seat of a chronic diffuse nephritis. Discussing the relationship between this renal condition and acute rheumatism, the author concludes that at present no such relationship can be affirmed, inasmuch as it is by no means established that the purpura rheumatica is of rheumatic origin. It is quite possible that the rheumatism may prepare the tissues for the favorable reception of the infectious cause of the purpura, and secondarily of the Bright's disease. Or it is possible that the hæmic alterations due to the rheumatism were the prime factor in the production both of the hæmorrhages and the renal complication. Goldstein<sup>1026</sup> mentions a case of nephritis, and with it severe cerebral symptoms, occurring after revaccination in a man 40 years of age, previously quite healthy. There enters into the history of the case, which the author records as one of acute infectious nephritis, a history of recent alcoholic excess.

Hollopeter<sup>19</sup> made a case of acute nephritis following an attack of whooping-cough in a little boy the subject of a clinical lecture. The whooping-cough had been quite severe, but the child was apparently recovering nicely, the cough having disappeared, when a relapse occurred. Within the first forty-eight hours of this relapse the renal complication became noticeable, and a uræmic condition rapidly supervened, characterized by œdema of the lids and dependent parts and by stupor. The patient at the time of presentation to the class had, in a very fair measure, recov-

ered. Hervouet<sup>127</sup><sub>Aug.12</sub> publishes his remarks upon a case of ordinary acute catarrhal nephritis, in which he seeks to ascribe its origin to erysipelatous infection, in that there was an indefinite history of some facial inflammatory swelling some time previously, from which there had persisted a few ulcerations in the nose. The author regards the case as one of an acute infectious nature, and reviews this subject in a clear manner; but the evidence upon which his arguments for infection are based seems somewhat weak, to say the least. Reymond<sup>7</sup><sub>No.15</sub> brought before the Anatomical Society of Paris sections of the kidneys of a case which died under his care from a nephritis arising in the course of a pyæmia due to the generalization from furuncles upon the chest. When the patient, a woman, was seen first, there was a large patch of dermal eruption, much resembling erysipelas, upon her chest, and scattered over this were a number of furuncles. Furuncles were also found upon the limbs. One of these furuncles extended so deep as to set up a localized purulent pleurisy, which was found at section. After this eruption appeared a short time, a pneumonic process became prominently marked, and diarrhœa developed. After a time the woman aborted, and died the next day. Suppurative foci were found irregularly distributed through the tissues, and the kidneys were the seat of a large number of minute abscesses, especially in the cortex. Examination of the bacteria from the surface eruption indicated the presence of the staphylococci of suppuration and of the pneumococcus, but no streptococci of erysipelas were found; in the renal abscesses the staphylococci were found. This case is, of course, not essentially one of Bright's disease, such acute interstitial processes being scarcely recognized as belonging within that category; but the process of change of elimination is essentially similar here to other forms of acute infectious nephritis, the difference being due to the active altering power possessed by this micro-organism over the connective tissues. Lecorché and Talamon<sup>31</sup><sub>Sept.10</sub> publish the records of a case of Bright's disease developing acutely in the secondary stage of a case of acquired syphilis. From their observations the authors draw these conclusions: Syphilis in its secondary period may, like scarlatina, pneumonia, and other micro-organismal diseases, determine the occurrence of a diffuse nephritis, characterized by all the symptoms of acute Bright's disease. To this affec-

tion the writers would apply the name "early syphilitic Bright's disease," referring it to the secondary stage of the syphilis, and describing better than the term "renal syphilis" the general aspect of the case, which is really one of nephritis, and not simply an albuminuria. The gross appearances of the kidneys are those of the large, soft, spotted kind; and there is nothing present entirely characteristic of syphilis. The lesions, as those of any acute nephritis, may become chronic, and approach those of one of the terminal stages of Bright's disease. However, this early form of syphilitic Bright's disease is characterized essentially by its curability under the influence of appropriate treatment; and this curability is at least equal to that of scarlatinal nephritis. The appropriate treatment is that of secondary syphilis, consisting, in spite of opposed views, of mercurials, preferably administered by the skin.

Perhaps at no time previously has the question of the infectious nature of the renal affections known as Bright's disease been so forcibly placed before the profession, and there can be no doubt of the prominence which will be hereafter accorded to infectious influences in the production of the malady. This infectious factor may vary from one which, from its special tendency to induce inflammatory or degenerative changes in the kidney alone, may almost be spoken of as the specific cause of such changes, down through the entire category of infections, until the malarial or the syphilitic infection is reached, which gives an easy transition to those non-vital poisons, like lead, whose action these lower grades of micro-organismal influences so closely simulate, especially in their late stages.

An interesting example of chronic nephritis produced by the action of lead is mentioned by Jaccoud.<sup>3</sup><sub>Dec. 17, '90</sub> The patient had been a painter, and had been exposed to the saturnine poison for many years, without any especial inconvenience. However, in his forty-seventh year of life, he began to complain of intense headaches, of slight failure of eyesight, of œdema of the legs, of an urgent necessity to get up a number of times at night to urinate. Upon examination, a considerable amount of albumen was found in the urine. The case succumbed, within a month after entrance into the hospital, from uræmia; and autopsy justified the primary diagnosis of a chronic interstitial nephritis. Closely allied to such

a cause as lead and the other members of its class may be mentioned the products of incomplete or pernicious digestion, the importance of which is insisted upon by Gray,<sup>81</sup> Dec., '90 who, unwittingly, takes much the same view as to the production of the albuminuria, and this he evidently regards as synonymous with nephritis, as does Semmola. He believes that the incomplete transformation of the albumens leads to the production of a relative albuminæmia, and from this by evident steps an albuminuria; so, too, the various toxic substances from perverted digestion are brought to the kidneys, and in their excretion produce a like train of events. As much as forty years ago Semmola had noted that the degree of albumen excretion in cases of Bright's disease depends not so much upon the state of the renal alterations as upon the hæmic condition; and in 1861 he published the results of investigations which led him to conclude that, in the pathogenesis of Bright's disease, as a rule, the renal lesion occurs secondarily, the albuminuria being the primary pathological occurrence. From this position Semmola has gradually elaborated his views as to the nature and origin of albuminuria and Bright's disease, which have been several times noted in previous editions of this review. A recent address before the Academy of Medicine of Paris by Semmola<sup>57</sup> July 26, Aug. 2, 9 is devoted to the defense of his position, which he states in the following manner: There is no exact relation of cause and effect between the severity of the renal lesion and the degree of albumen excretion, and one can influence the latter only by the state of the blood-albumens without any reference to the condition of the kidneys. The existence of an altered state of the hæmic albumens with the elimination through the kidneys of non-assimilable albumens is capable after a time of bringing about the histological changes which are characteristic of nephritis. It is possible to separate the renal lesion diagnostically from the albuminuria which precedes it; that is, it is possible to experimentally call into existence a nephritis which, up to a certain time, namely, when the hæmatogenous source of the albuminuria has been exhausted, is incapable of permitting the escape of serum-albumen into the urine. These positions Semmola defends by numerous experiments and clinical considerations, which must undoubtedly, in a proportion of cases at least, hold. The necessary alterations of the albumens of the blood may be the result of the absorption

of products of incomplete digestion ; or may, on the other hand, be the result of some process directly acting upon the hæmic elements. In either instance, probably, a brief duration of such a condition would induce no more serious result than the so-called transient functional albuminurias, but when continued is liable to end in actual disease of the kidneys.

Beaugnies-Corbeau <sup>24</sup><sub>Apr.5</sub> publishes a case of albuminuria which occurred in the course of a subhepatic pleurisy which arose without apparent cause. The patient, a woman, had had some time previously a rather severe perityphlitis, and from this a peritonitis, particularly about the hepatic region, and, although this had practically ceased, the pleurisy may have arisen from extension from this source. The diet was carefully regulated, almost confined to milk, and the patient progressed well ; some days after the occurrence of the attack the patient insisted upon eating veal, and as a consequence presented intense symptoms of an auto-intoxication, and the production of a marked hæmoglobinuria along with the albuminuria. At no time were there any evidences, either general or local, of nephritis, and the attack, under careful treatment, passed gradually away. It is quite credible that should a condition of maldigestion, sufficient to produce such blood changes, persist for a time, it would eventually be capable, by irritation, of producing wide-spread tissue changes, especially in the kidney area.

Kennedy <sup>1</sup><sub>Mar.21</sub> publishes a paper in which he calls attention to the influence of heredity in renal disease. His case, however, scarcely bears him out, as his description of the appearances of the organs as found at autopsy do not indicate the diseased condition with the certainty which he assumes. Kennedy had lost the father of the case in question from uræmia developed after an operation of external urethrotomy, and was called into service for the treatment of the posthumous infant some weeks later. The child, when born, was apparently healthy, but had been nourished upon some brand of condensed milk after the first week of its life because of failure of the mother's milk. Under this diet it became emaciated and drowsy, and after a few days, in spite of change of food and treatment, died. At the autopsy the writer states that nothing was found to account for death, save in the kidneys, which he evidently regards as the seat of a decided inflammatory change. "They were lobular in outline, representing

three distinct lobes. Numerous sulci or depressions were found upon their external surfaces. The capsule was adherent, particularly at the sulci, where the lobes joined each other. . . . On section the cortex was found very much increased. Minute deposits of uric acid were found here and there, and several small cavities were exposed, from which exuded tiny drops of an opaque fluid." The writer has failed to recall here that the lobulated condition of the human kidney in foetal and early life is a normal feature and the slight adhesions in the sulci not essentially abnormal. So, too, one expects to find a relatively thick cortex in relation to the medulla in early life, as well as plugs of uric acid in the tubules. Of course, even leaving these considerations aside, there may have been present some nephritic element; but the evidence adduced is scarcely sufficient to place all the blame upon the kidneys, especially when it is remembered that in many cases of intestinal disturbances little or no appearance of inflammation remains in the intestinal mucous membrane.

In two clinical lectures Lancereaux<sup>55</sup><sub>Mar. 28, Apr. 11;</sub><sup>90</sup><sub>June</sub> called up the question of the origin of interstitial nephritis. He stated that there were three types of interstitial nephritis, all of arterial origin: (1) elderly persons who possess also other symptoms of arterio-sclerosis; (2) young persons with an inherited predisposition to arterio-sclerosis; and (3) young persons with lowered or suppressed development of the nervous system. Lancereaux believes that interstitial nephritis is the outcome of a neurosis; the trophic and vasomotor functions of the nerve-cells are disordered, and as a consequence alterations of the walls of the blood-vessels, the joints, and the bones ensue. He speaks of this neurosis as herpetism, and regards it as a distinct disease. One of the consequences of this neurosis, of its trophic disorders, is endarteritis; this given, the rest of the train of the vascular and renal changes develops mechanically. In the cases of interstitial nephritis from vascular aphasia there is essentially the same arterio-sclerosis as in the other forms, although the vascular insufficiency is the prime element in the disturbances which produce this sclerosis instead of an endarteritis arising from trophic failure.

*Symptomatology.*—Of all the symptoms of Bright's disease none have been more unhesitatingly relied upon as an index of the presence and intensity of a nephritis than the albuminuria.

But within the past six or eight years this reliance has steadily decreased, and its importance in the symptom-complex declined apace. The increase of knowledge of the pathological physiology of the affection has led to a recognition of so varied sources of albuminuria that its discovery in a given case arouses scarcely more than a suspicion of renal disease; and, indeed, there is probably no question which, at the present time, in relation to the affection, is being more ardently discussed than that of the existence of a truly physiological albuminuria. At the risk of making this section subsidiary to this one symptom, albuminuria will be reviewed at this point in its clinical phases.

Of the authorities who maintain the existence of a physiological albuminuria and the absence of relation between this and any renal alteration one of the most prominent is Senator, of Berlin. Following the publication of the second edition of his monograph upon albuminuria and the appearance of a French edition he became involved in a somewhat spirited controversy with Lecorché and Talamon. <sup>31</sup> <sup>202</sup>  
Feb. 19, Mar. 19, Apr. 9, May 7; Apr. 25 Senator's position is, briefly, that urine is a product of transudation, and normally contains a certain amount of albumen, like all transudation fluids; that this normal amount of albumen in the urine may be increased without actual fault of the kidneys to the production of the so-called "physiological albuminurias," which he believes must be regarded as standing in the same line with physiological glycosuria or oxaluria. On the other hand, Lecorché and Talamon deny the existence of an albuminuria of physiological nature. They do not deny that albumen may be found in the urine of a large proportion of the population, but do refuse to admit that the frequency of the symptom is a reason for regarding it as a physiological occurrence. Nor are they willing to accept the mere appearance of health in albuminurics apparently healthy as indicating anything as to the condition of the internal organs; and they assert that there are no positive points of distinction between the albuminuria of so-called physiological type and that due to actual renal disease. Further, they believe that every albuminuria of origin above the lower urinary tracts is indicative of some lesion, however slight at times, in the renal structure. In the earliest manifestations of albuminuria and in its slighter degrees the lesion is usually located in the renal glomerules,—in other

words, consists of a glomerulitis,—and this may or may not be associated with inflammatory changes along the vascular and interstitial areas or with degenerative alterations in the epithelial lining of the urinary tubules.

Lecorché and Talamon call attention to the fact that the proportion of albuminurics increases with advance in years so as to attain between the ages of 60 and 90 years the proportions of 50, 60, and 70 per cent.; and this increase in the frequency of albuminuria corresponds with a similar increase in the occurrence of renal lesions. To such an extent does this increased frequency of renal lesions occur with advance of years, that, of 75 aged persons dying without having presented symptoms which were directly referable to the presence of disease of the kidneys, 56 showed, at autopsy, kidneys in a condition of alteration, marked and wide-spread, which could only have been produced by a slow and long-continued process of disease. The position of these French writers is well defended by citation of clinical and post-mortem observations, by which they endeavor to prove that under all circumstances, apparently physiological or pathological, an albuminuria means some fault of the epithelial covering of the glomerules.

Lecorché and Talamon also answer the article of Davis,<sup>61</sup>  
June 13 in which the latter, considering the albuminuria of persons apparently healthy and life-assurance, states that he believes that there is warrant for acceptance of such risks, at least for a short term of years, providing certain rules which he lays down be adhered to. These rules are, briefly, as follow: 1. That there be no history of Bright's disease heredity in the family, and no other evidence of renal disease in the individual than albuminuria. 2. The candidate should be under 40 years of age, free from history of gout, rheumatism, syphilis, plumbism, acute nephritis, intemperance, chronic dyspepsia, or œdemas. 3. There should be no evidences of disturbance of the cardiac or vascular systems. 4. There should be no retinal changes. 5. The physical appearances of the urine should be normal, or at least not indicate an excretion of solids less than normal. 6. The albumen when precipitated should not exceed one-eighth of the urine, and there should be a daily period when the urine is free from albumen. 7. There should be no tube-casts present; when, however, the specific gravity and quan-

tity of the urine are normal, the author does not regard a few hyaline casts as of especial consequence. Lecorché and Talamou<sup>31</sup><sub>July 9</sub>, acquiesce in the statement Davis makes that the albuminuric, otherwise apparently healthy, might with propriety be admitted for a short term to the advantages of life-assurance; but, with pertinence, ask for how long a time can albuminuria exist in an individual apparently healthy without determining serious morbid troubles, and, given a certain number of albuminurics, what proportion may be expected to terminate in pronounced Bright's disease? Whatever else may be said, the authors would remind the physician, in the presence of the candidate for life-insurance, that every albuminuria, of whatever form it may be, may be the starting-point of a case of Bright's disease, although Bright's disease need not necessarily arise from every albuminuria. To accept such a candidate must be imprudent, for in six months or a year the albuminuria may be transformed into an undoubted case of Bright's disease; to refuse the candidate is rather severe, for in six months or a year the albuminuria may disappear. Only one absolute rule should be laid down, according to these writers, and that is to wait. As long as *albuminuria minima* persists without any other symptoms, one has no right either to accept or to refuse the candidate; and a postponement for six months, a year, or more, will alone permit the true valuation of the condition, giving the renal lesion time to develop into a decided and apparent condition, or to reach a definite cure. A position of precisely the same significance is taken by Purdy<sup>1</sup><sub>Feb. 28</sub> in an article upon examination of the urine for life-insurance. While he recognizes the growing belief among many authorities that the so-called physiological albuminurias should not debar an applicant from the privileges of life-insurance, he desires to particularly urge the fact that small quantities of albumen in the urine constitute no evidence whatever that the kidneys are not seriously involved. So, too, the occasional presence of albumen must not be looked upon with the carelessness that is by many exercised toward the physiological albuminurias so named. He would insist upon it that it is full time to stamp out entirely the idea, that has come to be so prevalent among the profession, that the slighter traces of albumen in the urine are of no grave significance. He mentions an instance where a special examination of a case was referred to him by the medical officers

of a prominent life-insurance company with a mere trace of albumen in the urine. He sought and found other evidences of a renal involvement, and advised strongly against the risk; another company accepted the risk for \$10,000, and, before the second annual premium, were called upon to make payment of that sum of money.

A case cited by Brennan<sup>1</sup><sub>July 4</sub> is quite relevant at this point. The writer states it is as his belief, based upon certain observations made as an examining physician in a life-assurance company, that while cases of intermittent or physiological albuminuria may be looked upon with slight apprehension for any near consequences, in most cases they terminate in positive renal alterations. He was fortunate enough to secure the opportunity for post-mortem examination of a case of intermittent albuminuria he had examined during life several times, finding albumen once out of eight examinations. In the kidney there was marked vascular injection of glomeruli; the epithelium of the convoluted tubes contained a small amount of fat, in minute but distinct drops. The glomerular capsules were thickened by fibrous tissue in concentric layers. Here and there were small areas of round-cell infiltration. The anatomical diagnosis set down from the post-mortem findings was: venous engorgement of lungs, liver, and kidneys; chronic aortic endarteritis; slight chronic nephritis. The death of this man was due to morphia, taken with suicidal intent, after he had succeeded in insuring his life for large amounts of money in several companies. The records of several other intermittent cases of albuminuria are also mentioned, arising from mental strain, excessive ingestion of eggs, and from a diathetic origin, but bear but little upon the question in point. In spite of the undoubted pathological indications of this case, the author would not make any absolute rule to refuse an albuminuric the privileges of life-insurance if no other evidences of disease were present, but in doubtful cases would depend upon other evidences that might be met in the urine of the completeness of the function of the kidneys. Millard, whose studies in the more delicate researches for minute proportions of albumen in the urine have resulted in the well-known reagent bearing his name, does not hesitate to state<sup>1</sup><sub>May</sub>, that, in his opinion, albuminuria, natural or artificial, never occurs except as the result of pathological changes in the kidney, and is consequently never normal or physiological, and is never to be regarded without distrust. In his

experience, it is rare in making autopsies to find absolutely normal kidneys, the microscope usually indicating at least some degree of cirrhosis, of cloudy swelling of the epithelia, or glomerulitis. As to the prognosis of such minimal or intermittent albuminurias, Millard states that in but a small proportion of cases has he known it to disappear permanently if it has already existed for a long period. In such cases, too, he would hesitate to say that the albuminuria is cured unless, the urine being carefully examined from time to time, no albumen is found for a long time, arterial tension be absent, the heart normal, and the general health good. There are doubtless many cases who, while albuminuric, enjoy good health and live to a good age, and who are therefore not unfit subjects for life-insurance; but, given a case of renal albuminuria, Millard quotes Lecorché and Talamon from the article above noticed, to the effect that it is impossible to attach any prognostic value, direct or remote, to the condition. He continues, with these writers, that albuminuria indicates a lesion of the glomerular filtering membrane, nothing else; and to form an idea of the profundity, extent, and gravity of the lesion, other sources of information are to be searched.

“Is There Such a Thing as a Physiological Albuminuria?” constitutes the title of a paper by Jasiewicz,<sup>471</sup> <sup>24</sup> <sup>112</sup> the answer to which question the writer indicates in general by negation. He details a case of slowly increasing albuminuria which he had had under observation for five years. The patient, at the end of that period, was apparently in good health, excepting the albuminuria; but from the fact that the urea was decreased, the specific gravity, and, hence, the total solids, lowered, the author is disposed to regard the case as one of evolution into chronic Bright's disease, a view which gained the approval of a number of members of the Society of Practical Medicine of Paris, before which he presented his observations. Jackson<sup>99</sup> <sup>May 14</sup> states that it has been his experience, having made a large number of analyses of urine from cases of all sorts, never to have met with a single case of albuminuria in which a microscopical examination did not disclose some pathological condition of the kidney or uropoietic system sufficient to account for the symptom. Sometimes single examinations would be negative in this or that case, but repeated searchings were invariably attended with the discovery of some pathological

evidence. The position taken by the writer was supported by Wood, of the Harvard Medical School, who expressed himself as believing the source of renal albuminurias to be invariably some structural fault of the organ. Similarly, Rothrock<sup>105</sup><sub>Aug.1</sub> is disposed to regard cases of persistent albuminuria in those who present no other evidence of renal disease as serious, inasmuch as the history of these cases is one by no means always reassuring. He mentions several instances of undoubted Bright's disease, as proved by the post-mortem findings, in whom the symptom albuminuria was present but rarely, and then, as a rule, in minute quantities only. Winternitz, of Strasburg,<sup>83</sup><sub>Mar.24</sub> after a series of carefully-conducted examinations of normal urine in concentrated condition, using the more delicate test reagents for the detection of albumen, and guarding his experiments by a control series with the same methods, does not hesitate to place himself in opposition to Senator, Posner, and other believers in the constant existence of an albuminuria in normal urine. By his control experiments he proved the capability of his reagents to detect between 1 and 2 parts of albumen in 100,000 parts of urine; and in none of his examinations of normal urine could he obtain the slightest results with the same reagents; and, as a result, he states that, in his opinion, the presence of albumen in any quantity is not characteristic of normal urine. He, however, does not fail to recognize that often small amounts do occur in what may be called normal urine tentatively; but he refuses to acknowledge that this amount may reach the proportions mentioned by certain writers without pathological significance. Plosz<sup>559</sup><sub>Nos.42,43,'90</sub> also refuses to accept the views taken by Senator and his fellows. He looks upon many of the instances where these authorities claim to obtain an albuminous reaction in normal urine as faulty, believing that they are really dealing with mucin, and by a special method of examination endeavors to demonstrate his opinion. The many points of entrance of faint amounts of mucin from the mucous membrane of the urinary or genital passages suggest strongly the probability of the correctness of these views in many cases, the reaction of mucin to the albumen reagents easily suggesting a faint response from minute amounts of albumen.

Reviewing these publications bearing upon the nature and prognosis of minimal albuminurias, one cannot help being struck

by the fact that where an albuminuria has existed for any extended period it is very apt to terminate in pronounced nephritis; and, further, that while those who contend against the existence of a normal albuminuria cannot deny that individuals do exist with the symptom, without any inconvenience, even for a good length of years, on the other hand, those who believe that albumen exists normally in the urine are unable to practically demonstrate its existence in even a larger proportion of individuals than that in whose urine the condition is apparent. While, perhaps, as a symptom albuminuria will never again be regarded with the same assurance as to its diagnostic and prognostic value, it is a sign of a vigorous reaction against the excessive disregard of its worth that the present year's journalistic literature should, with as much unanimity as is above indicated, protest against the nihilistic school represented by Senator, Posner, and others. The term physiological albuminuria has, however, met with favor in the profession, and will probably continue in use, whatever the belief as to the existence of a really normal urinary albumen. It is scarcely likely to have any further significance, however, than those cases which are indeterminately spoken of as physiological, cyclical, intermittent, postural, dietetic, and developmental. These are, however, as a class, an exaggeration of those minimal albuminurias which by investigators were coming to be regarded as truly physiological, and only in the minds of a few are deemed without pathological relation. The frequent existence of general circulatory abnormality, a suggestive precedence of some infectious or other cause for a nephritis, and the frequent discovery upon the post-mortem table of positive, although usually slight, pathological changes in the renal structure, all constitute a potent argument for the pathological nature of these cases. The very diversity and relative insignificance of the causes ascribed to these cases suggest strongly the existence of some deeper and more potent factor underlying the entire group, an abnormally low resistive power in some part of the process of urinary excretion, either in some fault of the blood or circulatory elements of the function, or of the renal glandular action, or both.

Whatever else may be said of the theory broached by Semmola this must be granted it, that it covers the area of possibility in respect to the origin of the symptom in naming the hæmic,

circulatory, and glandular factors in the fulfillment of the functions. An interesting experiment, confirming the opinion that circulatory disturbances are an essential feature in these so-called physiological albuminurias, is recorded by Casaretti,<sup>900</sup> <sup>2</sup> <sup>Aug. 20; Sept. 26</sup> who obtained curious results in several cases by applying bandages about the limbs. The symptom was of the ordinary cyclical form in all the cases, but the application of the bandages caused it to completely disappear, and that in a short time; and in a case of permanent albuminuria from nephritis it decidedly lowered the intensity of the condition. At the same time the excretion of urea was also diminished. The author remarks that the alteration of the renal circulation must be very slight indeed to thus rapidly modify or abolish the symptom. It must be slight to be thus easily and rapidly influenced, and one can easily comprehend a failure to recognize its existence and understand how an albuminuria, dependent upon such slight alteration, should come to be viewed as not abnormal. The instances where change of posture from a horizontal position without albuminuria to the erect induces the appearance of albumen in the urine point in the same direction. Moritz,<sup>21</sup> <sup>June 1</sup> brought such a case before the notice of the St. Petersburg Medical Society,—occurring in a lad of 17 years of age, the symptom apparently being in some manner due to an attack of angina. The albumen appeared with the greatest regularity in the urine when the erect posture was assumed and disappeared when the patient was kept in bed. No casts were discoverable; and the author, being led to look upon the condition as due to altered conditions of pressure in the renal circulation, kept the patient continuously in bed for a protracted period, and eventually obtained a favorable result. A similar case is mentioned by Lunin,<sup>21</sup> <sup>June 8</sup> occurring in a 12-year-old boy who, in early life, had had rickets, pertussis, and with the latter double catarrhal pneumonia. Since 5 years of age, however, until the present his apparent health was good; but in 1885 he began to excrete an increased amount of urine. As diabetes mellitus was known to have occurred in the family the urine was submitted to examination, with the result that albumen was found, but no sugar. Frequent subsequent examinations established the fact that the urine of the periods of rest was free from albumen, the latter appearing regularly, however, as soon as the patient arose from bed. No casts, except one

questionable one, were found. In 1889 some febrile malady was encountered, the fever continuing about ten weeks; during this illness, the patient being kept in bed, no albumen was to be found in the urine, but as soon as he arose it re-appeared. Gradually the little patient lost his bright and eager appearance, his interest in his studies waned, and he became quite dull, although physically not much altered. Another case belonging in the same category is named by Herringham, <sup>2</sup><sub>Jan. 31</sub> occurring in a young male, aged 13 years, of a generally relaxed, flabby habit, in whom position exercised an evident influence upon the excretion of albumen. So, too, the case published by Long, <sup>2019</sup><sub>90</sub> of a woman whose urine, taken at times of activity during the day, showed the presence of albumen, but, taken in the early morning (*i.e.*, after a night's rest in the horizontal position), was free from it. At the time of pregnancy it was noted that gradually the albuminuria diminished and disappeared, to re-appear after delivery. The enlargement of the uterus and other elements arising during the period of pregnancy, acting to the increase of the vascular pressure and the increase of vascular tonicity, probably would account for the disappearance of the phenomenon. From a careful observation of several cases of intermittent albuminuria, Verco <sup>267</sup><sub>Aug.</sub> concludes that this form of the condition is not so much dependent upon posture, diet, or excretion as upon the question of warmth. The horizontal posture, this writer states, while it is associated with cessation of albumen excretion when the patient is warm, does not prevent traces of albumen from being excreted if the patient lie uncovered and be chilled. So the erect posture, in Verco's experience, in a warm, dry room, is accompanied by little or no albumen excretion; but the erect position plus cold, as in the open air or in currents of air, is invariably followed by the appearance of albumen in the urine. The author infers, from these results, that the warmth in bed is antagonistic to whatever pathological conditions induce albuminuria; so that, whatever albumen or degree of albuminuria appears, the patient should at once be placed in bed, particularly where acute renal alteration can be recognized. In the convalescence from acute renal affections the author cautions that reliance must not be placed on the absence of albumen from the urine while the patient is yet in bed, inasmuch as after the exposure to the atmosphere outside the bed-clothes and the assumption of the erect position, the

urine is particularly liable to become again albuminous. Huebner<sup>2154 32</sup><sub>p.170, '90; Sept.</sub> has observed several cases of cyclical albuminuria in the children of the same family, at or near the age of puberty. From these and other instances in his knowledge he has come to look upon cyclical albuminuria as a special and peculiar form of chronic albumen excretion, independent, in his opinion, of structural change of the kidneys, and associated with a particular developmental period of the organism (that of growth). He believes it to be an expression of general debility, but does not seek to more accurately explain it. The prognosis is good if proper care be taken of the case; the patient should be treated with due attention to nutrition, by iron, by the avoidance of bodily and mental strain, and by rest in bed for several days at a time at frequent intervals, especially if the patient be young.

While the importance of the symptom albuminuria as a diagnostic indication of the existence of renal disease is denied and strenuously asserted, it is quite as important to realize that occasionally it is absent in well-marked instances of chronic nephritis. Coquet<sup>70</sup><sub>Dec.14, '90</sub> recently devoted a thesis to the study of nephritis unaccompanied by albuminuria. After numerous citations he divides these cases into three classes: (*a*) those from which the symptom is absent but a portion of the time, (*b*) those from which it is absent until just before death, and (*c*) those from which it is absent all the time. This classification bears no particular relation to the clinical course of the case, but illustrates somewhat more fully the vagaries of the symptom. He believes that it is not to be regarded as the criterion of the presence of Bright's disease, the only certain sign of which is, in his opinion, the degree of toxicity of the urine.

Chabrely,<sup>2054 17 188</sup><sub>'90; Dec.16, '90; Apr.5</sub> in his thesis upon albuminuria and interstitial nephritis in the old, views the symptom in much the same light. Often the only indication of a Bright's disease, it may be entirely absent in a pronounced case, and its intensity varies without direct reference to the degree of renal alteration, and is often intermittent in pronounced cases of nephritis. The author does not believe that among the aged there is such a thing as physiological albuminuria. Porter<sup>462</sup><sub>Jan.</sub> concludes as follows upon the source and significance of albumen in the urine: (1) That the albumen found in the urine, except that which occurs in the

early stages of an acute exudative or diffuse nephritis, is a derived albumen, and not serum-albumen; (2) in the early stage of the acute exudative or diffuse nephritis, the albumen comes directly from the blood-vessels, due to the inflammatory alteration in their walls, and is of the type of serum-albumen; (3) that, later in the course of the same form of nephritis, when the vascular walls have partially recovered from their primary inflammatory damage, the albumen becomes more abundant in quantity; but is now of the derived-albumen type, and has been excreted by the damaged epithelial cells lining the uriniferous tubules; (4) that in all conditions, except the acute exudative or diffuse nephritis, when albumen is found in the urine, it is due to changes in the epithelium, by which the latter is rendered unable to perform its work properly and excretes or allows a derived form of albumen to pass through into the urine; (5) that this retrograde change in the epithelial cells is secondary to an impaired nutritive condition at large, together with an overworked state of the renal cells, without a compensatory nutrition being maintained; (6) that the quantity of albumen in the urine is always in direct proportion to the amount of retrograde change in the tubular epithelium; (7) viewed in this light, treatment of the condition should be directed to improving the general condition of the system, and at the same time to diminishing the amount of work to be accomplished by the kidneys. In some cases of Bright's disease, after careful treatment has produced its expected consequences, there persists a certain amount of albumen in the urine, which remains in spite of all efforts to bring about its total disappearance, and after the patient is apparently well.

This albuminuria is believed by Cuffer and Gaston <sup>92</sup>Feb.; July 18 <sup>9</sup>to be due to a localized partial nephritis,—a remnant of the previous process. They think it is useless to continue treatment, and regard it as a sort of deformity,—not an actual, progressive disease, but rather a condition to be remembered only in order to avoid putting excessive work at any time upon the organs. They mention 4 illustrative cases, but do not give any anatomical proof. They do not pretend that the subject of this condition is sound, but he will live if he takes the proper precautions to avoid cold and all causes of renal irritation, dietetic or medicinal. As to the influence of irritants upon the albuminuria of Bright's disease, Feldgun, <sup>2005</sup>No. 4, '90-'91; Mar.

who has carried out a clinical research upon the action of black pepper and mustard upon this symptom in 8 cases of chronic nephritis, states the following conclusions: In cases of chronic Bright's disease the more or less prolonged use of these substances is followed by a distinct increase in the albuminuria, even when they are taken in ordinary dietetic amounts. The unfavorable influence is met both in the interstitial and parenchymatous varieties of the disease, and simultaneously with the increase of albuminuria dropsical symptoms are aggravated. As to their further consequences, it is probable that pepper increases the flow of urine somewhat; neither have any effect upon the compensatory work of the heart. Both are distinctly contra-indicated, especially in the parenchymatous form of disease, in which their use may cause decided aggravation of existing symptoms.

Mabboux<sup>211 9</sup><sub>Jan. 25, Feb. 8; Apr. 18</sub> considers at some length the significance of albumen in the urine before dealing with the albuminuria co-existing with renal gravel, the subject of his paper. Given an ordinary case of albuminuria, with clear urine and absence of pus and blood, he would refer an albuminuria to one of the following points of origin: from a physiological disposition toward the condition, recent traumatism of the lumbar region, tubular or glomerular desquamation due to some recent infection, as scarlatina, chronic nephritis in its early or later stages, or a calculous condition of the kidneys. The albuminuria from the existence of renal gravel is usually a transient one due to one of these factors: the presence in the kidney of agglomerated sand or of larger, isolated concretions attached to the mucous surface of the tubules, the movement or the disturbance starting up the motion of these concretions, or arrest of the moving concretions, obstruction of urine, and renal colic. It may thus be a symptom of renal lithiasis in its earlier stages, when it is of an irritative origin; or it occurs in the later and more advanced stages, along with albuminuria arising from pyelonephritis and other obstructive causes. It is due to alterations in the character of the blood in the first place, to alterations in the pressure and flow of the renal circulation, and to lesions of the renal epithelium. For example, the arrest of a concretion at some point is apt to lead to an obstruction of the flow of urine, and thus a cyst is produced which presses upon the adjacent blood-vessels, and causes a passive congestion which, with the alteration

of the tubular epithelium apt to co-exist, is probably sufficient to determine the symptom. The albuminuria is simply a protest on the part of the kidney against the presence of the calculous concretions, which act as foreign bodies. Balzer and Souplet<sup>3</sup><sub>p.145</sub> have met, out of over 150 cases of cystitis or orchitis, with an albuminuria in about 12 per cent. of cases. It is often unsuspected in these cases, and may vary very much in its intensity, as well as in the uniformity of its appearance. The writers believe that, in these instances, the albuminuria appears as the result of an ascending generalization of the inflammatory process over the surface of the bladder to the ureter and pelvis of the kidney.

Mesnard<sup>70</sup><sub>Dec. 7, 14, '90</sub> does not look upon albuminuria as a symptom of unquestionable prognostic and diagnostic value. He cites several instances of clear Bright's disease, in which the condition did not obtain or occurred only at intervals, and in very small proportions, and shows that in some cases, at least, the intensity and character of the condition are almost without value to indicate the degree of pathological change in the kidneys, or the imminence of the grave occurrences common in Bright's disease. Rather would he rely, for the purpose of estimating the danger of the various auto-intoxications threatening or supervening in the course of a case, by reckoning the degree of toxicity of the urine. This is to be done by injecting into the venous circulation, or hypodermatically, the clear, carefully-filtered urine of the case until a fatal result is produced upon the animal used for the experiment. As a rule, a rabbit is chosen for the purpose, and the intensity of the toxic power estimated in relation to the toxic power of normal urine, Bouchard having found that, for every kilogramme of body-weight of the animal experimented upon, 50 cubic centimetres (1 $\frac{3}{4}$  ounces) of normal urine are required to produce lethal toxication. Where the toxic power of the urine is increased, it indicates a free excretion of the poisonous principles developed within the diseased body; where the renal function is relatively torpid, the toxic power of the urine is diminished. In its milder type the evidences of this renal torpidity is met sometimes before the recognition of actual renal disease, and is probably productive of just such symptoms as are often ascribed to "biliousness," or "hepatic torpor."

Hare,<sup>112</sup><sub>Mar.</sub> in a brief but clear exposition of this condition, mentions several illustrative cases, one of which seems particularly

happy at this point. The patient was a male aged 29 years, who was apparently in perfect general health, but much confined by his business to desk work. There was nothing in his previous history, as to disease. He suffered from frequent attacks of headache and indigestion, which were not dependent upon indiscretions in diet or hours, as far as could be determined. They followed after periods of languor and irritability, gradually becoming more and more pronounced, and were accompanied, on the day of the culmination of the attack, by drowsiness, slowness of thought, inaptitude for conversation, and sometimes a slight amnesic aphasia. Following these symptoms the headache became rapidly severe, the extremities cold, and a sense of nausea became manifest. During this time there was little or no secretion of urine, but after several hours of severe headache a sense of fullness about the neck of the bladder usually came on, partly relieved by the passage of a few drops of concentrated urine, which did not, however, scald the urethra. Soon after this the urine secretion became profuse; the fluid was limpid, low in specific gravity, and very scalding to the urethral mucous membrane. These attacks came on irrespective of diet or manner of living, and were always preceded for several days by the secretion of concentrated urine of decided odor. They could always be prevented if the patient took a large amount of Vichy or other diuretic water when periods of increased specific gravity of urine occurred. In the graver conditions of this renal torpidity, as spoken of by Mesnard, marked by periods of decreased toxicity of the urine, uræmic symptoms as generally understood present. Withington,<sup>99</sup> Sept. 10 speaking of the same condition under the term of "prodromata of chronic Bright's disease," places foremost some manifestation of gout, as influencing the development of chronic interstitial nephritis. This gouty element may be latent, giving rise to no more patent sign than lithuria, or may be more pronounced. In a less degree, as a diathetic antecedent of Bright's disease, the author mentions rheumatism, which, in a chronic form, may precede the manifestations of renal inadequacy for a long period, or may, by an acute attack, declare a contracted kidney, the patient failing to rally well from the attack because of the renal condition. He, further, adopts the condition of renal impotence described by Sir Andrew Clark,<sup>2</sup> Feb. 4, '83 in which, without evident disease of the kid-

neys, the urine is apt to be a bit scant, to have a low specific gravity, and to be deficient in urea. Further, there are apt to be evidences of unfavorable functional activity in almost all the organs of the body. For example, early in the establishment of chronic Bright's disease, especially the interstitial variety, the mind seems somewhat fogged or "muddy," the soundness of business judgment is apt to be impaired; there are irritability, petulance, and depression often noted; the patient may become a little self-distrustful, suspicious, or somewhat secretive about his affairs or intentions; he is easily annoyed by loud noises, is disinclined to exercise his intellect, apt to doze in the day and be wakeful at night, and in many ways indicates the approach to the borders of insanity.

In this connection the paper of Alice Bennett<sup>139</sup><sub>Dec., '90</sub> upon the relations of insanity to Bright's disease, referred to in the last edition of the ANNUAL, may be recalled. Disorders of sleep and motor and sensory disturbances may be met with, as staggering, dizziness, or neuralgias. Digestive symptoms, dyspepsia, diarrhœa alternating with constipation, circulatory disturbances, increased vascular tension, cardiac palpitation, hæmorrhages, increased micturition, respiratory faults, dyspnœa, asthma, and cough—all these and others may be expected, singly or in groups, with greater or less frequency in the early forms of the chronic disease. Whether one recognizes an underlying condition of uræmia, producing these symptoms, or not, it may be said, from their first manifestations, that they are probably the results of auto-intoxication, induced from renal insufficiency. In the milder and earlier instances the relation of these symptoms to the renal affection is not always apparent, but in the later stages the dependence often becomes very clear. For instance, Raymond<sup>55</sup><sub>Nos. 25, 26, '90</sub><sup>32</sup><sub>Sept.</sub> records the case of a patient who suffered from insanity and chronic nephritis. In the course of several years he observed that, whenever the renal disease was exacerbated, the patient's mental condition also became worse. Another case, a lady, in whom the autopsy showed interstitial nephritis, passed the last weeks of her life in a state of acute delusional insanity. A case mentioned by Brissaud and Loring<sup>100</sup><sub>Nos. 31, 32, '90</sub><sup>32</sup><sub>Sept.</sub> was quite similar to this last one, except that the case became cataleptic and manifested bulbar phenomena a short while before death. In a clinical lecture recently delivered, Joffroy<sup>14</sup><sub>Feb. 4</sub>

considers this subject of insanity of Bright's disease, and is careful to distinguish those cases where the insanity exists along with, but independently of, the renal condition, not being influenced either in its inception or in its manifestations by the nephritis, and those cases which are called into being by the toxication from the renal inadequacy, or those which, existing perhaps latently as a hereditary predisposition, are intensified by the influence of the disease of the kidneys so as to become manifest. Such a classification is of importance not only as an etiological study, but as indicative of valuable diagnostic, prognostic, and therapeutic considerations. For example, the latter classes of cases may be examined as to their mental condition, with a view of estimating as well the degree of failure of the renal function; so, too, these cases are more yielding, the treatment of the underlying nephritis modifying the symptomatic mental condition. Florant<sup>2054; 100</sup><sub>July 14,16</sub> covers much the same ground. The mental symptoms arising from uræmia, the active ones, vary from a simple mania to the better and clearer marked insanities. Sometimes it would seem, says this author, that the uræmic poison alone suffices to engender these psychic disturbances. Most frequently, however, the delirium or insanity occurs because, either from an insane predisposition or from a general neurotic predisposition, the brain is found a point of diminished resistive power. Careful examination into the personal and family history for one or the other of these predispositions is a matter of greatest importance in the matter of diagnosis, of prognosis, and of treatment. Remondino<sup>242</sup><sub>Oct</sub> publishes a case in which alternation of coma with maniacal outbursts and with occasional delirium marked even more clearly the relationship between the ordinary manifestations of uræmia and conditions of alienism. The patient, a strongly-built, well-nourished, and powerful man, with a dull intellect and rather sluggish nervous function, eventually recovered from all active symptoms.

Belonging essentially to the same class of symptoms, inasmuch as the same origin often exists, a group of respiratory symptoms marks the early stages of Bright's disease, becoming more and more intense with the advance of the case, and eventually becoming almost constant and very prominent in pronounced uræmia. It has long been believed that the dyspnœa of advanced Bright's disease is of toxæmic origin, and so it probably is in a

number of instances; at least, in a certain degree. But, aside from the direct action of the toxic retention substances upon the respiratory centres or upon the respiratory tissues, there must be remembered the circulatory element. Steell,<sup>90</sup><sub>Oct.</sub> in an admirable article upon the subject, is, perhaps, too much disposed to regard the cardiac factor in these cases and to grant too little influence from the toxæmia. He calls attention to the many similar features between the dyspnœa of Bright's disease and that from accepted cardiac origin,—the breathlessness on even slight exertion, the distressing paroxysms at night, the influence of the horizontal position to increase the severity, and the fact that Cheyne-Stokes respiration is not infrequent in either. The value of the nitrites and of alcohol,—perhaps, too, of small doses of morphia,—by diminishing the vascular spasm, may, in this gentleman's opinion, be thus explained. He recognizes the deleterious effect that morphia exerts upon the renal function in these cases, but, in small, guarded doses, believes it one of the most valuable means in quieting this dyspnœa; if the dyspnœa were toxæmic, he says, this action would be inexplicable, poison being merely added to poison. Further, there are present, in these cases, other evidences of circulatory disturbances: congestion of the lungs, œdema, enlarged and tender liver, lividity of the lips, and marked tension of the pulse. The author does not believe that the pulse often changes to one of low tension, even if the circulation be failing, inasmuch as the sphygmographic tracings usually show a fairly-developed tidal wave to the end of the case. He reminds the reader of the fact that such circulatory dyspnœa may appear with a urine departing considerably from the type of urine generally described as typical of chronic nephritis. As a rule it is concentrated, high in color or deep-amber colored, and may deposit urates and contain a marked proportion of albumen; but not infrequently the urine may be found light in color, free from deposit of urates, and containing but the faintest trace of albumen. The sudden form of pulmonary œdema, with dyspnœa and albuminous expectoration, described by Bouveret,<sup>41</sup><sub>Nov. 27, '90</sub> and mentioned in the last edition of this work, furnishes a link in the argument for a circulatory origin of the dyspnœa; and, when one considers the clinical aspects of these cases, one feels disposed to agree with Steell as to the importance of the cardiac factor in exciting such dyspnœa. Nevertheless,

the influence of the toxæmia is probably here to be insisted upon in the establishment of the circulatory alterations which make possible the secondary pulmonary faults. Steell would not accept such a view, and, in fact, passes it by with but a mention as unworthy of discussion; but this neglect seems rather to argue the weakness of his position in relation to it. Landouzy<sup>212</sup><sub>Aug.10</sub> would, indeed, emphasize the fact that in many instances there is too great a tendency to regard as cardiac a toxæmic dyspnœa, and urges that in such cases of dyspnœa, where no auscultatory symptoms are present, even if the urinary phenomena are not calculated to impress very strongly the fact of a decided renal alteration, the possibility of uræmic origin be gravely considered. He mentions several instances where the withdrawal of cardiac stimulants and morphia, given with a view of correcting a cardiac error, and the substitution of remedies and measures for the correction of a toxæmia, were followed by a successful result.

The œdemas of advanced renal disease are dependent upon the circulatory disturbances, and are marked by a peculiar irregularity of location, although, as a rule, they are first met about the face and hands or feet. Mendel<sup>37</sup><sub>May</sub>; <sup>9</sup><sub>July 11</sub> mentions a case occurring in a man 50 years of age, in whom this symptom had occurred in various positions,—face, hands, feet, and scrotum. At one time he was rather suddenly seized with severe attack of dyspnœa, due to an œdema of the pharyngeal walls and those of the upper part of the larynx. In the course of several days, under the use of a spray of carbolic acid and an absolute milk diet, the œdema disappeared. Tschirkow<sup>590</sup><sub>No.2</sub>; <sup>3</sup><sub>No.24</sub> calls attention to a form of œdema which is to be excluded in the consideration of the symptoms of Bright's disease. It is a superficial œdema in persons free from any traces of albuminuria, and unaffected by any alterations of heart or lungs. In none of the cases he has met has he been able to establish any relation with the hæmic condition, as in chlorosis. But the fact of the co-existence of specific history in 1 case, an indefinite history of multiple peripheral neuritis in a second, although the history of the other 2 cases in his series was entirely negative as to lues, led to the administration of iodide of potassium. The rapid disappearance of the œdema from all 4 cases makes the writer look upon the phenomenon as due to some syphilitic affection of the vasomotor system. Musser,<sup>760</sup><sub>Oct.17</sub> in a clini-

cal lecture at the Philadelphia Hospital, calls particular attention to the high arterial tension in cases of chronic Bright's disease, referring to the renal inadequacy and retained substances as an important factor in the etiology of the symptom. Saverny<sup>2054; 136 121</sup>  
<sup>May 1; July</sup> reviews the symptom of epistaxis in Bright's disease, and considers it due to a sanguine dyscrasia, to alterations of the vessels supplying the nasal mucous membrane, to cardiac hypertrophy, and to increased arterial tension. As a symptom it occurs most frequently in the interstitial form of Bright's disease, and is apt to appear principally at the beginning and at the end of the malady. Sometimes it is the first sign which excites a suspicion of the affection, and is thus a symptom of considerable diagnostic value. Because of the loss of blood and the grave conditions which it often forbodes, the prognosis of the symptom is always serious. On a line with this subject is that of cerebral hæmorrhages of advanced Bright's disease. A case of the latter variety is reported by Walsh<sup>22</sup>  
<sup>Nov. 26, '90</sup> as occurring under the care of Suckling in the Birmingham Workhouse Infirmary. The patient presented a train of symptoms quite common to the course of the chronic interstitial form of the disease, and showed marks of a slight, old, retinal hæmorrhage. There occurred improvement of the severer symptoms during the period of treatment, but one night the patient became quickly sleepless and delirious, and was found the following morning in a comatose condition. His temperature was slightly subnormal; there were no convulsions; the bladder was not distended; pulse, 80, small, compressible; pupils equal, a little dilated, reacting to light; no strabismus; no paralysis. Croton-oil was given, and hypodermatics of pilocarpine; but the coma deepened, the breathing becoming stertorous, the chest filling with râles, and pulse and respirations failed almost synchronously. At post-mortem examination the kidneys were found in an advanced condition of disease, and the other organs were correspondingly altered. In the brain, to the left of the aqueduct of Sylvius, there was a small hæmorrhage, of the size of a pea, flattened from above downward in its site in the pontine part of the floor of the fourth ventricle. The question of a failure to recognize the hæmorrhage previously existing is considered as quite improbable, the position of the hæmorrhage being possibly without well-marked symptoms being developed, especially in an unconscious person, the pressure being

probably upon sensory cells and upon some of the fibres of the fifth nerve. The character of the clots was such as to lead the physicians at the autopsy to believe that it had not existed for any length of time; and the case is summed up as one in which a hæmorrhage occurred, without producing recognizable symptoms, followed by coma and death, probably due to uræmia.

Among this group of cases marked by hæmic and circulatory disturbances arising from the action of retained toxic principles there should also be mentioned the case detailed by Hollopeter,<sup>19 Jan. 10</sup>—a case of chronic parenchymatous nephritis giving rise to symptoms mistaken for those of chlorosis. The patient, a girl 15 years old, had had measles when 3 years of age, but since then had been quite well until her thirteenth year, when she was noticed to lose her activity, and did not seem to relish food as before. Her disposition became more and more sluggish and retiring, her desire for companionship grew indifferent, and gradually she became morose and irritable and a day-dreamer. The girl was pale; there was a heavy, fetid odor on her breath; there was no dropsy; the heart was accelerated; and, in spite of the fact that the breasts were beginning to enlarge, although as yet there had not been any menstruation, the writer was disposed to look upon the case as one of chlorosis. On the very next day, however, the author was hastily summoned to the girl's bedside, to find her in a pronounced condition of uræmia, from which she was improving at the time of the record.

Among the first functions of the body to be influenced by the failure of the kidneys in the removal of effete material is that of the gastro-intestinal system. Kravkoff, of St. Petersburg,<sup>25 Jan. 20</sup> has examined the condition of the stomach in 26 cases of chronic parenchymatous and interstitial nephritis, mostly in middle-aged patients. The main results of the observations may be given as follows: 1. In a small number the free hydrochloric acid was found normal in amount, but the amount of pepsin lowered. In the majority of cases the proportion of the acid was subnormal, the amount of pepsin also being diminished, although digestion of a proteid tablet (a constant size being maintained through the experiments) was accomplished in from one and one-half to nine hours. In others the diminution of acid and pepsin was of such a degree that the proteid tablet was found undigested in the

stomach-juice even after twenty-four hours. 2. Lactic acid was found present in all three of these groups. 3. Peptones were found in most of the cases, except in a few instances in the third group. 4. The proportion of the parapeptones always was found oscillating inversely to that of the peptones. 5. The rennet ferment was also uniformly present, but showed a distinct diminution in power in some cases of the third group. 6. The process of saccharification seemed to be normal. 7. The absorptive power of the stomach did not deviate from the standards, except in several cases in the third group, when it was found diminished. 8. The motor power of the viscus was diminished in but a few cases, and these in the last group. 9. With improvement of the patient's general health and the decrease of albuminuria and dropsy, the digestive power of the gastric juice and the proportion of free hydrochloric acid usually increased correspondingly. The writer's general conclusion is, that renal disease produces a marked influence upon the chemistry of gastric digestion.

Conclusions of much the same nature are published by Bier-nacki. <sup>4</sup> <sup>154</sup> <sup>No. 25; Nov.</sup> Lancereaux, <sup>40</sup> <sup>202</sup> <sup>Mar.; Aug. 10</sup> in discussing the subject of uræmia, calls especial attention to that form of uræmia which manifests itself in the mouth and pharynx,—bucco-pharyngeal uræmia. This form of the symptom presents, besides the general features of uræmia, certain local conditions, marked by the presence in the mouth and pharynx of a thick, gummy mucus covering the walls of these cavities. When it is detached the membrane beneath is red and dry, but not ulcerated; although the similarity to a pseudo-membranous formation is close enough to mislead the incautious. Lancereaux is ignorant of the condition of the origin of this form of uræmic localization, but queries whether it be not the elimination by the salivary glands of a considerable proportion of excrementitious material. In ordinary cases the tongue of the uræmic is red, with a moist, yellowish or grayish fur in the centre. While this bucco-pharyngeal variety of uræmia is not at all common, gastric and intestinal uræmias are not in the least infrequent. Vomiting in the former and a serous diarrhœa in the latter are the revealing evidences of these localizations of the toxæmia. In the beginning the characters of the vomit are those of an exaggeration of the normal secretions of the stomach's mucous coat, but later changes in this membrane contribute to change the character of

the vomit. The writer suggests a direct relation between central nervous disturbance of a toxæmic nature and this symptom,—vomiting,—inasmuch as it is not infrequently accompanied with hiccough, bulbar dyspnœa, and other cerebro-spinal phenomena, and presents a number of analogies to vomiting known to be of central origin. Hirschler,<sup>84</sup><sub>Mar. 21</sub> with a view of investigating the nature and origin of the diarrhœa of uræmic conditions, has studied the action of various constituents of the urine upon intestinal peristalsis. He has found that creatin, and carbonate of ammonium as well, increase the movements of the intestines through the medium of the vagus nerve, while urea, creatinin, and sodium chloride increase peristalsis by their direct action on the intestinal wall. Phosphate of calcium, calcium chloride, hippuric acid, allantoin, and sodium phosphate have no influence. These experiments were practiced upon young dogs; the peritoneal cavity being opened, under a warm 6-per-cent. solution of sodium chloride, and the reagents injected into the intestine, or injected into the jugular vein with the vagus nerves first uncut, then cut. It is probable that among the other substances retained in the body, and contributing to constitute the uræmic poison, there will be found some substance directly paralyzant to intestinal movement, or, as is more likely, that the final result of stimulation by the substances just named is the exhaustion and paralysis of the intestinal coats or of the nervous centres presiding over peristalsis. It is not a very uncommon occurrence, although not frequently referred to for obvious reasons, to have the uræmic diarrhœa followed by a condition of intestinal paralysis; and in one instance at least, reported by Marshall and Laplace, before the Philadelphia Pathological Society, a case of uræmia was unwittingly operated upon for the relief of a supposed intestinal obstruction.

Taylor<sup>53</sup><sub>Nov. 18, '90</sub> reports a case in which, from the symptoms presented, the existence of a typhlitis was for a time suspected, although the true nature of the case was speedily declared by a uræmic headache, accompanied by blindness, which appeared soon after the patient was first seen. A second case is mentioned by this writer, in which the cephalalgia was the most marked feature. These intestinal derangements characterize so large a class of uræmics, the disturbance being generally of the nature of diarrhœa (although curious and startling gastro-intestinal symptoms

are also sometimes presented), that many writers caution the practitioner to constantly suspect those seeking treatment for persistent alimentary troubles of being affected with an underlying nephritis; and Musser<sup>760</sup><sub>Oct. 17</sub> warns against the administration of an opiate in the treatment of any diarrhœa patient above 50 years of age, recognizing the untoward effect of opium in cases of renal insufficiency.

Aside from these varied symptoms which bear an evident relation to the toxæmic condition in chronic nephritis—a toxæmia varying in its intensity up to those severe degrees commonly spoken of under the term “uræmia”—is a class of urinary symptoms which are probably partly to be explained by the irritative nature of the altered urine and partly by the influence of the hæmotoxic condition upon the nervous control of the lower urinary tracts. Brodie<sup>70</sup><sub>Feb. 15</sub> says that most renal affections, especially those connected with neuralgic or inflammatory disturbance of the secretory apparatus, are often accompanied by vesical symptoms, more or less intense, without the bladder appearing affected. These symptoms are, in a general way, those of vesical irritation, and find their most common exponent in the pollakiuria of chronic Bright's disease, a symptom which is clearly not to be referred constantly to irritative urine. Occasionally arthritic symptoms, closely simulating those of acute arthritic rheumatism, occur as part of the uræmic complex. Such a case is mentioned by Bustamente,<sup>907</sup><sub>Aug.</sub> in the person of a patient who had been affected for a considerable period with well-marked chronic parenchymatous nephritis. In the latter part of April, 1890, the patient noticed that the œdema, which was almost constantly present in slight degree, was becoming increased, and that the flow of urine was becoming less. At the same time he complained of intense pain in the joints of the foot and knee, without any special increase in temperature. The pain increased daily with the increasing renal insufficiency. In the early days of May uræmic convulsions of an epileptiform type appeared, followed by coma. The efforts of the physician, by producing free purgation and diuresis, were successful the following day in procuring a return of the conscious condition; and, singularly, with the disappearance of the uræmic coma the articular pains diminished, and left entirely. It is quite possible that this attack was a coincident rheumatism, or that the entire

paroxysm was induced by a co-existing cerebral and articular rheumatism; but the author, after consideration of this possibility, is inclined to adhere to his view that the articular symptoms were manifestations of a poisoned state of the blood, due to renal insufficiency. In the same paper the author mentions 2 instances of uræmic dyspnœa. In the first of these, a young man aged 26 years, the dyspnœa occurred after a period of urinary suppression, and was accompanied by an intense lassitude, but without any lesion of the respiratory or circulatory apparatus. On the second day the dyspnœa developed into a decided asphyxia, and the patient died, without having manifested the least evidence of any lesion of any part of the respiratory apparatus, without the slightest œdema, and without any cardiac affection to explain the rapid and fatal onset. The other case occurred in an old man, was accompanied by œdema, and was being gradually benefited by medication, when suddenly a second attack supervened, and the patient died.

Perhaps, of any of the writers who have been devoting their clinical work to the consideration of uræmia, Lancereaux has most clearly outlined the most advanced thought upon the origin, nature, and presentation of this form of intoxication. In his consideration of the nervous manifestations of uræmia, <sup>242</sup><sub>May</sub> he would separate thoroughly this form of uræmia from the gastro-intestinal form, in that he looks upon the latter class as really compensatory in nature, and, in so far, more significant. Among the purely nervous accidents he first separates, for descriptive purpose, the group of cardio-pulmonary accidents, these being the expression not of any local action of the uræmic poison on the thoracic organs, but of the functional disorders of their nervous centres. The dyspnœa of uræmia is divided by the writer into three forms: the simple form, characterized by acceleration of respiration and diminution of the fullness of respiration; the paroxysmal form, or Cheyne-Stokes respiration, in which a period of apnœa alternates with one of dyspnœa of regularly varying fullness; and the spasmodic dyspnœa, which closely simulates spasmodic asthma. The circulatory disturbances are generally of the nature of palpitations, more or less intense, of the heart and sometimes of the vessels, often intermittent in occurrence and sometimes the cause of sleeplessness. The cerebral accidents of uræmia are sensory, motor,

and intellectual, either singly or simultaneously. To the sensory disturbances belong various subjective sensations of pruritus, of numbness, and of pain in different parts of the body, and visual disturbances. The articular pains described above probably are to be classified here as to the headache of chronic nephritis. The uræmic motor disturbances manifest themselves as contractures, convulsions, and even palsies; the intellectual, as aphasia, coma, changes of character, and insanity. In a clinical lecture upon the pathogenesis of uræmia, this author,<sup>40</sup> after reviewing the anatomical and chemical theories of the origin of the condition, sums up in much the following manner: Uræmia arises from a deficient elimination by the kidneys of various substances, and particularly of organic matters resulting from the waste of tissues. These substances, if the renal function is diminished or ceases from any cause, may be eliminated by the stomach and intestines, constituting the form known as *gastro-intestinal*; finally, where this elimination also fails, these substances are retained in the blood, and tend to localize their action on the central nervous system, particularly on the bulb, the functions of which are disturbed by them, giving rise to the *dyspnœic* and *cerebro-spinal* form.

Clinical observations upon cases of Bright's disease are recorded by Csáthy,<sup>84</sup> Anders,<sup>19</sup> Perignon,<sup>220</sup> Delafield,<sup>19</sup> Longstreth,<sup>19</sup> Edes,<sup>81</sup> Musser,<sup>43</sup> and Picot.<sup>70</sup> The first of these writers, Csáthy, recognizes six forms of nephritis,—an acute diffuse nephritis, chronic diffuse nephritis, the secondary contracted kidney, the hæmorrhagic contracted kidney, the true contracted kidney, and, finally, the amyloid kidney. The writer looks upon a high proportion of globulin in the urine as a characteristic sign of this last-named variety. The secondarily contracted kidney he regards as arising as the result of rational therapy of either an acute or a chronic diffuse nephritis; and it is stated that this opinion is borne out by numerous examples of the intermediate stages afforded the author in his clinical position. Anders mentions two instances of chronic diffuse nephritis: one in a man of 33 years of age, arising apparently from the results of an attack of rheumatism, unassociated with cardiac trouble, but accompanied by hepatic cirrhosis. The other case, a woman aged 43 years, gave also an indefinite history of rheumatism, but the graver stages of the disease were induced by an attack of influenza.

There were in this case mitral valvular regurgitant and obstructive lesions, as well as the evidences of tricuspid insufficiency. The lecturer regarded the renal and cardiac lesions as probably arising independently of each other, although having decided mutual influence in the latter stages of each. Delafield's case was one of chronic diffuse or exudative nephritis with aortic valvular insufficiency and obstruction, presenting dyspnœa, dropsy, and a high degree of anæmia. The articles of Picot are devoted to the discussion of a case of *valvulitis vegetans*, from which had arisen a form of nephritis, invading both parenchymatous and interstitial substance, as found at the autopsy, ordinarily termed diffuse nephritis, but to which he applies the term "mixed nephritis."

Longstreth presented before his class a little colored boy, aged 10 years, who had been picked up, in a comatose condition, on the street by the police, and conveyed to the hospital. His respirations were shallow and irregular; heart's action not at all weak, and rapid; pupils dilated; no strabismus. In several hours consciousness returned; he complained only of abdominal pain, and stated that he had been busy all morning running errands. The urine was found to contain large amounts of albumen, and the general course of the case was one of severe acute nephritis. Several days after admission, after a day's partial suppression of urine, another convulsion occurred, from which he recovered, to become unconscious again the following day. Under general depletive treatment the case eventually reached a fairly comfortable condition, although at the time of his presentation to the class the boy was far from recovered, the urine being highly albuminous and full of casts. The origin of the disease in this case could not be stated with any definiteness. The case detailed by Musser was a woman of middle age, who had been exposed to cold and wet just before the onset of the attack. The urine was albuminous and scanty; there was wide-spread œdema, the body-cavities being occupied by effusion; there was considerable dyspnœa and cough. The heart was but little affected, the sounds weak, a slight mitral systolic murmur,—evidences, perhaps, of a mild degree of dilatation. Taking the condition of the heart into consideration, the lecturer was disposed to believe that the renal affection had not existed any length of time, and that this was the primary attack.

Under rest in bed and mild diuresis the patient was rapidly improving at the time of presentation to the class.

An exceedingly interesting case is mentioned by Rattray and Smith,<sup>2</sup><sub>Jan.31</sub> of a short, thickset, plethoric man, of 45 years of age, who, after several weeks' illness with symptoms of hepatic disturbance, was taken seriously ill and went to bed, where he remained for a number of weeks with symptoms precisely those of acute Bright's disease. Fever ran high; the urine was scanty, high-colored, and smoky, containing casts of blood and granular matter. Examining the patient about a week after this second attack, a tender point was found over the left kidney upon deep abdominal palpation. This was supposed to be due to a pyelonephritis, probably from the presence of a calculus, and the other symptoms were referred to a similar cause. The symptoms gradually diminished, the albumen left the urine, and the patient was apparently convalescent from the attack, when an exacerbation occurred two weeks after the beginning of this second attack; recrudescence of symptoms again occurred in two weeks, and in six weeks after this last. Finally, the patient handed his physician a small bit of tissue, which he had passed, with considerable pain, by the urethra, two days after the final exacerbation of his symptoms. During this period of exacerbation the symptoms were those of renal colic, affecting the left side. After the passage of the tissue the patient rapidly recovered, and resumed his business. The tissue appeared to the naked eye to be the tip of a renal papilla, and microscopical examination confirmed this opinion.

The younger Vergely<sup>188</sup><sub>Mar.22</sub> reports a case of a man, aged 55 years, who had been ill for some time with the symptoms of chronic Bright's disease. One evening he presented a slight swelling of the right side of the face and complained of some toothache. The next day the swelling was much worse, occupying the entire side of the face. It was hard, the skin was not especially red, and it was not especially characteristic in any way of erysipelas. The symptoms became much aggravated; dyspnoea and fever became pronounced; the throat became involved in the swelling, and the patient died. Cultures made from the swollen area demonstrated the presence of the streptococcus of erysipelas. A very similar case recently occurred in the experience of the editor, the point of erysipelatous inoculation being in the anterior

portion of the nose. Occurring in an advanced case of Bright's disease, the attack was fatal, all the symptoms of the renal affection being greatly intensified.

*Pathology.*—In a communication to the Association of American Physicians, Delafield <sup>2029 ; 99</sup><sub>Oct. 15</sub> proposes, as a more accurate classification of affections commonly known as Bright's disease, a division according to the nature of the morbid process in the kidneys. There are three morbid processes in the kidneys,—congestion, inflammation, and degeneration,—which produce definite anatomical changes and give rise to the symptomatology of the affection in hand. A classification based upon these processes would include acute and chronic congestion, acute and chronic degeneration, and the following forms of inflammation: acute exudative, acute productive or diffuse, chronic productive or diffuse with exudation, and chronic diffuse or productive without exudation. Of these the inflammatory are those requiring the most explanatory attention. Inflammation is attended with three features, which may occur simultaneously or separately,—escape of the elements of the blood from the vessels, formation of new tissue, and death of tissue,—being respectively exudative, productive, and necrotic. Exudative nephritis is of short duration, leaving no permanent remains, and is capable of benefit by treatment. Productive inflammation may be acute, subacute, or chronic, and effects permanent changes in the inflamed parts. The acute exudative nephritis corresponds with the process usually termed catarrhal, whereas the acute productive includes those cases of acute Bright's disease characterized by the evidence of proliferation, as in acute glomerulo-nephritis. The chronic form of productive or diffuse nephritis with exudation regards the chronic catarrhal varieties, particularly that form known as fatty and contracted; the chronic diffuse without exudation corresponds to the red, granular kidney. Discussing this pathological classification, Councilman referred to his own efforts at classification of the affections included in the term Bright's disease from an etiological stand-point. Lesions of the kidney may be divided into two forms,—focal and diffuse. The kidneys being dependent upon the blood, both for their nutrition and the accomplishment of their functions, are especially liable to suffer from the consequences of hæmic disturbance. In order that changes result from this factor, there must be some alteration in the character of

the blood, in the amount of blood going to the kidneys, in the blood-pressure ; or some interference with the removal of the excretion of the kidney may, on the other hand, produce the primary disturbance. The focal lesions are produced by substances which reach the kidney in an insoluble form ; these are essentially the bacterial lesions of the kidney,—the tubercles, abscesses, and so on. The other class—the diffused lesions—is due to soluble substances brought to the kidneys. These, being distributed through the blood, are necessarily diffused through the renal structure, and the lesions are, in consequence, also diffuse. These are the lesions which come on in consequence of the infectious diseases, and in consequence of chemical substances whose nature is not well known, and constitute a number of varieties of chronic diffused Bright's disease. These injurious substances can also reach the kidney by way of the ureters. Congestion of the kidney, either acute or chronic passive congestion, produces certain degenerations in the epithelium of the kidney ; and, secondarily, there may be further changes, inflammatory or degenerative, in the kidney-structure,—as, for example, the changes which accompany amyloid change in the glomeruli.

Studying the subject of coagulation necrosis, Israel <sup>20 213</sup><sub>B. 128, H. 2 ; May</sub> chose the kidney as offering the best conditions for the inquiry, because of the regularity and uniformity in size of the kidney-cells. The circulation was obstructed in a branch of the renal artery for several hours, and then, at periods varying from one hour to eight days thereafter, the kidney was extirpated. It was rare that all the epithelium in the obstructed area was necrosed, the latter process being generally limited to isolated patches. Most of these necrotic areas were in the cortex, and the effect was as well marked after two hours anæmia as after four, although, perhaps, the necrotic areas were not so large. At the end of twenty-four hours after obstruction of the circulation the nuclei had disappeared, although by a special method of fixing the tissue (Altmann) they remained visible, but homogeneous and diminished in size. The cell-body was found diminished in size, the lumen of the tube consequently increased ; and the granules in the cell-body irregularly huddled together, instead of being arranged in rows perpendicular to the basement membrane. Calcification began to appear in the cells twenty-four hours after necrosis. Another occurrence in the

necrotic areas, within twenty-four hours, was the formation of fibrin in a delicate net-work in the convoluted tubes, and in solid cylinders in the straight tubes. The process is much favored by the desquamation of the epithelial cells and denudation of the basement membrane; and these cylinders of fibrin are regarded as analogous to tube-casts. That similar disturbances sometimes occur in Bright's disease is possible, but the obstruction to the renal circulation is rarely so completely or so suddenly obstructed; and therefore the changes are not so pronounced and not so advanced in the retrograde change terminating in necrosis. A specimen shown by Thompson, <sup>2</sup> May 25, '89 before the Manchester Pathological Society, illustrates well the alterations found in the kidney in acute nephritis. The child died from uræmia, after a sudden illness, without any history of either scarlatina, diphtheria, or any other infectious disease. The kidneys were enlarged and swollen; and under the microscope the Malpighian tufts were swollen and anæmic, with the capsule thickened and studded thickly with proliferated cells. The epithelium of the tubules was swollen and clouded with granular deposit, and contained here and there groups of cocci or single ones; and in the tubules were granular masses, blood-casts, and collections of micro-organisms. Councilman <sup>764</sup> May, '90 calls attention to a case of acute nephritis in a cow. The animal had been ill for some months, and was greatly emaciated. A diagnosis of tuberculosis was made and the animal killed. At the autopsy the kidneys were found enormously enlarged and covered with small white elevations. On microscopical examination a general diffuse nephritis was found, with areas of acute inflammation corresponding to the white elevations. In these areas a short bacillus was found, both in gelatin cultures and in the sections. McCallum <sup>39</sup> Sept. 16 contributes a brief paper upon certain varied alterations which he has studied in a series of sixty sections from cases of renal disease. From his experience, he asserts that as a cause of death "simple acute Bright's disease" is very rare, the chronic character of the changes being particularly apparent in his entire series. Œdema of the epithelial cells he does not believe is ever limited to the glomerular epithelium, although the epithelial covering of the capillary tufts is particularly apt to be the seat of the process; it is met with from almost any acute disease. Fatty change of the epithelium is an evidence of a more chronic process, and is always

diffused through the epithelium lining the tubules, as well as that covering the glomerules. Exfoliation of epithelium appears most frequently in the scarlatinal kidney, but occurs as well in other toxic blood diseases. The exfoliation of the glomerular epithelium is sometimes of such intensity as to completely fill up the capsule with the crescent-shaped cells, and by pressure upon the tufts to induce urinary suppression. Hyaline change of the capillary walls is not at all infrequent, tending toward the obliteration of the lumen of the capillary, and hence an impoverished blood-supply to the convoluted tubes. The obstruction of a capillary loop by micro-organisms leads to an apparent thinning of the wall of the capillary and to the crowding of the neighboring capillaries with leucocytes. This formation of thrombi by leucocytes tends to arrest the circulation through the tuft, and leads to necrotic changes in the tuft and in the convoluted tubes.

While these changes are going on within the capsule, the surrounding tissues, particularly at the point of entrance and departure of the afferent and efferent vessels, is infiltrated by round-cells, which the author looks upon as the source of organization. Finally, in the study of the capsule and its contents, the writer speaks of the amyloid change. In the early stages of this deposit the arrangement of the amyloid matter is patchy, the deposition continuing until the wall is uniformly involved. It leaves an irregular lumen to the vessel, and, as a consequence of the diminished passage of blood through the tuft, the epithelium of the convoluted tubes becomes more or less necrosed. The author does not believe that the amyloid material is ever to be found outside of the vessels, and he denies the existence of true amyloid casts, not believing that the "waxy" casts, to which the name amyloid is sometimes applied, are constituted of amyloid material. He states that it is a common thing, while in health, for the lumen of the uriniferous tube to give a perfect cast of itself. These casts are long, stringy, and identical with what have been called "mucus-cylinders," and are, in the writer's opinion, made up of coagulated sero-albumen and paraglobulin. He believes, further, that the living epithelium secretes a ferment which causes the albumen, which chances to transude into the tubes, to become coagulated into these casts. He finds these casts most commonly in cases of physiological albuminuria, and states that they have some value

in recognizing functional albuminuria from the organic variety. Further changes in the renal cells in nephritis are those commonly known as "cloudy swelling," but the author objects to the term as too indefinite. He prefers to speak of the earliest changes as "œdema," shown by the distended and actually dilated membrana propria,—a change which he believes sometimes ends in the formation of a cyst. Following the œdema a hyaline change occurs in the cells, mostly confined to that half of the cell nearest the lumen of the tube; this degenerated part may eventually separate from the unchanged portion and contribute to the cast formation. The part of the cell left adherent to the basement membrane may rebuild its free border, and the writer states that the nucleus may at times be seen undergoing karyokinesis to replace the swept off cells. Another change in some way allied to the above is the fatty, the fat-droplets being mostly seen along the border of the cell, a change which is apt to be associated also with a complete denudation of the tubules.

Kahler, of Vienna,<sup>57 Feb. 8</sup> in a clinical lecture, was careful to separate both the pathological process and the clinical aspect of the genuine contracted kidney from those of the secondarily contracted kidney. The real granular or contracted kidney presents itself as the "red," eventually the "white," granular kidney, of a size of but a half or a third of the normal, with a thickened, opaque capsule, that is somewhat adherent to the renal substance. The organ is rather firm in consistence, and its surface exhibits more or less regular granulations, the projecting portions redder, and containing more blood than the depressed parts.

On section it is to be seen that the cortex has contributed a large part to the contraction of the organ, although the pyramids are found somewhat contracted and more or less deformed. Under the microscope the process shows itself as a distinctly interstitial inflammatory one, consisting in the new formation of connective tissue with its subsequent contraction. In brief, this description is one by no means new, differentiating these cases from the form spoken of by the author as "secondary," that in those cases in which connective-tissue formation and contraction has followed a previous process more or less limited to the epithelial portions of the kidney. The continuation of the article is devoted to the clinical separation of the primary granular kidney from the

secondarily contracted organ, the differences betraying themselves in symptoms in the circulatory apparatus, in the nervous system, and the character of the urine. In the last of these the increased frequency of micturition, and the polyuria, the low specific gravity, the slight degree of albuminuria, the microscopical appearance of the sediment, the relatively normal proportions of urea and other nitrogenous bodies, serve to mark the line of difference. A left-sided hypertrophy of the heart, a high blood-pressure, and a hard, strong pulse characterize the circulatory symptoms. On the part of the nervous system, the writer names the various ocular phenomena, the headache, and other common uræmic nervous symptoms; the latter not as characteristic of this form alone, but as occurring in all the varieties of the affection.

Before various societies there were presented recently several specimens of unilateral atrophic kidneys; one case, reported by Collins,<sup>2</sup><sub>Feb. 21</sub> was a small, flabby bit of tissue, with enlarged and dilated pelvis and ureter, the opposite organ being hypertrophied in compensation. Another very similar instance was reported by Vergely, the younger.<sup>188</sup><sub>Dec. 7, '90</sub> Both these cases were probably not due to direct inflammatory disturbance, but to a hydronephrosis in early life. De Sardac<sup>188</sup><sub>Dec. 21, '01</sub> also exhibited an instance of a unilateral atrophy, although in this instance the atrophic organ probably had functional power. The opposite organ was hypertrophied, as was to be expected. The man died a very short time after admission to the wards of the hospital, before any history of the case could be acquired. It was remarked that, of the persons dying suddenly upon the highways, most may be relied upon to have some renal disease.

*Prognosis.*—Reference must be made here to the discussion of the symptom albuminuria, particularly in relation to the question of its normal existence; while there are those who maintain their belief in the actual normality of the phenomenon, the majority of investigators are inclined to look with gravity upon every albuminuria, especially if it has endured for any length of time, recognizing the fact that a large proportion of these cases of so-called “physiological” albuminuria eventuate in true Bright's disease.

Is Bright's disease, once established, a curable affection? Perhaps nothing more apropos can be referred to than the paper

of Cuffer and Gaston,<sup>92 9</sup>  
Feb. ; July 18 these authors believing that a simple nephritis may be cured entirely, or, as very frequently occurs, but partially. They believe that in these last cases a limited, localized nephritis remains,—one which it is useless to combat, and which is persistent in spite of all treatment. It is to be looked upon as a deformity, as already stated; not an actual developing disease, the patient being carefully cautioned to keep ever in mind the necessity for personal care. Owing to a rumor that the present Secretary of State is the subject of advanced renal lesions, certain lay publications sent to a large number of prominent physicians, in this country and in Europe, the inquiry as to the curability of Bright's disease.<sup>202</sup>  
p.470 The answers received generally concurred that the disease is not an incurable one, and that by care life may be prolonged indefinitely after the establishment of the affection.

Upon the relation of albuminuria or Bright's disease upon the course of traumatism, Weiss<sup>184 14</sup>  
Feb.1; Mar.11 publishes a paper, which he prefaces by suggesting as the proper title, "A Surgical Disaster," and in which he narrates the course of a case in a man of 64 years of age, suffering from some slight surgical affection of one of the toes. The case demanded the amputation of the toe, and after a number of questions as to the state of his general health and an examination of the cardiac signs, but without more than a passing question as to the state of the urine, the operation was done. Shortly thereafter gangrené attacked the stump, rapidly spread, and led to the death of the patient in a few days. Examination of the urine at the first sign of an untoward result indicated the existence of contracted kidneys,—a fact to which the writer attributes the fatal end of his patient. The moral of this history, adds the author, is, that it is always important in any surgical operation, of whatever gravity, to examine with care into the general state of the patient's health, and not to be satisfied with appearances. He states that had he noticed the existence of the albuminuria he would have unhesitatingly refused operation, and that, for himself, a pupil of Verneuil, this case of gangrene, followed by such lamentable results, was the cause of a profound mortification.

*Treatment.*—Stcherbanoff<sup>100</sup>  
Mar.26 remarks, in his study of the treatment of Bright's disease, that there is no one method of treatment, each variety demanding a special routine. While the cor-

rejection of the loss of albumen is not the one demand for a course of treatment, it is one of the important symptomatic indications for treatment, and any method which fails to regard it as of gravity, or fails in its purpose to correct the albuminuria, is in so much faulty. The prolonged use of meat or of meat extracts, especially if taken in large amounts, is apt to cause inflammatory disturbances in the kidneys, as determined by investigations of Stewart. <sup>844 82</sup>  
Hence, nephritic cases should be allowed as little as possible of these viands, which are to be replaced by such substances as milk and the carbohydrates. Chéron <sup>17 112</sup><sub>June 23; Oct.</sub> reviews the various dietetic treatments of Bright's disease, and states as a general rule that dark meats and meat extracts should be avoided, these foods containing material particularly prone to form toxines. In the intervals when the active symptoms of the affection are not prominent white meats are permissible. All condiments are to be avoided. Fish is badly borne by some patients, but shell-fish in moderation may be used. As a rule, a milk and vegetable diet is the best borne, and most conducive to a favorable termination; but some cases cannot stand it, and in such a meat diet may be cautiously employed, the urine being frequently examined to see that the albumen does not increase. Eggs are a disputed article, some authorities favoring their employment, others discountenancing it; further, they are badly borne by some patients, but agree well with others, especially if the digestive tract be normal. Taken all in all, a milk diet is perhaps the best, acting as an easily assimilable nutrient, and at the same time as a diuretic. Three and a half to 4 litres (4 quarts) may be used daily, and when an absolute milk diet cannot be taken a mixed one, in which milk forms a large element, may be substituted. A grape diet, skimmed milk, or koumyss is sometimes of advantage. Beer and light wines are allowed in small amount by many authorities. Rest in bed, particularly in acute Bright's disease and in the exacerbations of the chronic form, is to be insisted upon. In the chronic form, where the cardiac condition or the polyuria does not forbid, a mild amount of exercise is of advantage. Particular care should always be devoted to the avoidance of chilling; the clothing must be studiously attended to, flannel under-clothing being insisted upon in winter. The functions of the skin should also be carefully looked after, and tepid or hot baths, followed by frictions, should

be employed, although no less authority than Lecorché and Talamon recommend cold baths. It would perhaps be a matter little hesitated over were the average practitioner to be asked as to the probable effect of alcohol, taken even in moderate quantities, upon a diseased kidney. So, too, the affirmative answer, given by the majority of medical men without equivocation, would be upheld by unanswerable clinical evidence, supported by very reasonable physiological or theoretical grounds. Gurwitsch, of St. Petersburg, <sup>844</sup> <sup>25</sup> however, details the results of a series of clinical experiments with the special object to ascertain the effects of spirits upon the albuminuria in Bright's disease. The conclusions may be mentioned as follows: When taken in moderate doses—from 3 to 6 ounces (81 to 162 grammes), of from 40 to 54 degrees' strength *per diem*—alcohol does not increase albuminuria, and generally does not cause any renal irritation, even if used with regularity from day to day for a period of some duration (a fortnight or more). Neither does it produce any appreciable impression on the secretion of urine (on the daily amount). The propositions hold equally true with regard to acute and chronic nephritis. Such clinical evidence finds an easy explanation in the well-established fact that in raw alcohol, even when ingested in fairly large doses, it is eliminated through the kidneys in but trifling quantities. Hence, nephritic cases can be safely allowed to take alcohol, provided it is used in moderate amounts, and in a more or less dilute form. Under certain conditions its administration may even be indicated in nephritis, since alcohol affords an excellent means for stimulating a weak heart and circulation. While dilating the peripheral blood-vessels, it tends to lessen renal congestion; it increases perspiration, stimulates the central nervous system, improves the appetite, and promotes assimilation of proteids; acts as an antiseptic agent, as well as a stimulant to peristalsis in the intestines, and raises the patient's general condition. Alcohol, probably, from these results, is not to be regarded as playing any direct part as a local renal irritant in the causation of Bright's disease.

The line of treatment mentioned by Musser <sup>43</sup> <sub>Dec., '90</sub> serves to illustrate the general course to be pursued in cases of acute nephritis. The first element is rest, with protection of the body by flannel next the skin, re-inforced by a flannel bandage about the waist, to

cover the kidney region. In children he counsels inunction of the skin to protect against catching cold. In the next place the renal function is to be increased. The character of the diuretic must depend upon the nature of the case, the acute nephritis demanding only the very mildest form of diuresis. This may be accomplished most simply by water, which produces diuresis by increasing the blood-pressure. Mildly alkaline drinks may be used in connection with or instead of plain water; these are useful sometimes in allaying gastric symptoms also. In the early stages, besides water, the only diuretics permissible are those which act only on the circulatory system,—as digitalis, given internally, or by means of the poultice made of the leaves. Where the vascular tension is already too high, particularly where the renal vascular tension is excessive, drugs which have the tendency of causing vascular relaxation, such as nitro-glycerin, find a valuable use. Where the urine is scanty and infrequent, the use of dry or wet cups over the region of the kidneys often proves advantageous. The renal congestion may also be relaxed by such means as mild purgation or by diaphoresis. Where there are uræmic symptoms prominent, these latter measures are to be promptly attended to. Purgation under these latter circumstances may be produced by such a drastic means as croton-oil; in less urgent cases, calomel, in small and frequently repeated doses, may be relied upon. Diaphoresis may be induced by such simple measures as the administration of neutral mixture; or, in more urgent cases, by the administration of jaborandi or pilocarpine; or the use of the hot-air bath may be undertaken as a means of diaphoresis nearly always applicable. In the treatment of the chronic forms of Bright's disease the predominating indication is the combating of the uræmic condition. Lancereaux<sup>40</sup> concludes a lecture upon the treatment of the latter condition by indicating the following two methods of treatment: The first of these is one which might be termed one of neutralization, the object of which is to check the action of the toxic agents carried along in the blood. With the exception of oxygen, which exerts a direct action upon the blood-globule, this method furnishes a number of but very doubtful means. The second is that having for its purpose the elimination of these toxins, the substitution or supplementing of the inadequate renal function by compensatory elimination through other channels: through the intestines, the

skin, by venesection, or by the formation of a large ulcer, through which the noxious matters shall be carried off in the discharge.

The use of large amounts of water, together with digitalis, for the purpose of diuresis, is warmly upheld by Tenbroeck<sup>186</sup> in a brief article, in which he mentions a number of cases—one comatose, one delirious, another with marked gastro-intestinal uræmia—in which the free use of water was promptly followed by improvement in the symptoms. In pronounced cases of uræmia with coma, where the exhibition of water by the mouth is impossible by ordinary means, forcible administration by the use of a stomach-tube may be employed; or sterilized water, with or without the addition of a saline, of the body temperature, may be injected directly into the venous circulation or thrown into one of the serous sacs, as the peritoneal cavity. Bozzolo<sup>589 537</sup><sub>Apr. 20; May 15</sub> mentions a case of a child, in an advanced uræmic condition with coma, where the use of purgative and diaphoretic measures had failed. He injected into the peritoneal sac warm, sterilized water to the amount of 1 litre (2 pints), and in a very brief period noted signs of improvement in the condition of the patient. Subcutaneous injections in the right thoracic region were also practiced. The urine began, almost at once, to increase in quantity and in specific gravity, and the case passed on to recovery. Fleiner,<sup>4 90</sup><sub>Dec. 1, '90; Mar.</sub> in a clinical paper, lays great stress upon the diuretic value of calomel in renal dropsy. The prevailing opinion has been opposed to the use of this drug in persons suffering from Bright's disease, from the assumption that it possesses a direct action on the kidney epithelium. Having as a student been impressed with the value of calomel as a remedy in these cases, he ventured its employment, in a case in which death from the œdema threatened, after having made use of a number of other substances without evident advantage. In two days he twice had opportunity to witness a rapid and decided improvement, the œdema disappearing. Two months afterward the patient suddenly died, and at the autopsy a diffuse nephritis was found.

As a means of correcting the albuminous excretion Dujardin-Beaumetz<sup>3</sup><sub>Nov. 4</sub> mentions favorably the salts of strontium. He has used the lactate of strontium, 6 grammes (1½ drachms) per day, together with a milk or milk and vegetable diet. He states that, in his experience, under such a course of treatment, the albuminuria is

diminished in a large number of cases, probably by favorably modifying the digestive functions. Bucquoy<sup>3</sup><sub>Nov.4</sub> states that, in the cases in which he has made use of strontium salts, it is true that the albumen has been reduced, but that otherwise the urine has remained the same, and the disease has not seemed otherwise modified. Lazarus<sup>271</sup><sub>Jan.</sub> commends warmly the use of water acidulated with muriatic acid for the same purpose; it is possible that whatever favorable influence it may exert is also due to its action upon the digestive functions. So, too, the curative value of small doses of corrosive sublimate, mentioned by Atkinson<sup>74</sup><sub>Jan.</sub> as noted in a case of acute nephritis with intense albuminuria, may, perhaps, be largely ascribed to the same mode of action; and the very favorable notice given by Woods<sup>267</sup><sub>Mar.</sub> of the rapid and complete disappearance of an albuminuria in a case of acute nephritis under the use of creolin cannot but be, in a degree at least, explained by the same supposition. Woods recommends that the drug be given in the following manner, to conceal its disagreeable properties:—

R Creolin, . . . . . f3vj ( 23.33 grammes).  
 Glycerin, . . . . . f3vj ( 29.83 grammes).  
 Mucilage of tragacanth, . . . . f3vj ( 29.83 grammes).  
 Orange-flower water, . . . . up to f3vj (180.00 grammes).

M. Sig.: Dessertspoonful to tablespoonful, thrice daily; best taken in milk.

Ross, of Belfast, Ireland,<sup>6</sup><sub>Sept.12</sub> commends the use of bicarbonate of soda and carbonate of bismuth several times daily, together with especial regard for clothing and warmth, in the correction of albumen excretions.

The suggestion made by Casaretti, above mentioned, of increasing vascular tension in some cases, should not be overlooked in this connection. Boardman<sup>105</sup><sub>June 15</sub> reports favorably upon the use of hypodermatic medication with a solution containing chloride of gold and sodium and iodide of manganese, made under the direction of a certain White.<sup>59</sup><sub>Mar.21</sub> The proportions of the solution were at the time kept secret by the inventor,—a circumstance easily interpreted in the light of the recent tuberculin *coup*, and one which should rather deter the scrupulous physician from its employment than in any way tend to generalize the treatment.

Saverny<sup>2054</sup><sub>136 121  
May 1, July</sub> devotes a chapter in his thesis upon epistaxis in Bright's disease to the treatment of this sometimes serious symptom. The treatment is invariably to be directed both to the

cause and to the direct stoppage of the hæmorrhage. Without forgetting that the arterio-sclerosis of the vessels of the pituitary membrane appears to be the essential condition giving rise to the condition, the local measures habitually used in epistaxis should be employed. But the true treatment, the author believes, exists in the absolute milk diet.

As to the treatment of dyspnœal symptoms, Steell,<sup>90</sup><sub>Oct</sub> believing that it is in the majority of cases really of cardiac origin and not due to central nervous disturbance by the action of noxious principles in the blood directly, urges that the prime indication is to ease the work upon the laboring heart. To this end, care in diet, low feeding, constant use of laxative saline waters, with an occasional sharp mercurial purge, serve much; the resistance to the heart's action from a contracted peripheral circulation being decidedly and sometimes permanently diminished. The nitrites are a valuable addition to pharmacology from this point of view. Having lowered the peripheral pressure, the heart's action is to be looked after, often requiring some stimulation. Digitalis has the disadvantage of increasing the peripheral pressure as well as stimulating the cardiac muscle; but it sometimes is found to act well in these cases. Where it cannot well be borne, the author suggests strophanthus, and nux vomica or strychnina is often a valuable adjunct. In the treatment of the dyspnœic paroxysm alcohol often gives rapid and great relief, but its frequent repetition must be injurious. The author confesses to a certain amount of disappointment in the use of the nitrites during the paroxysm; but by cautious administration has found morphine of the utmost value in easing the symptom. Morphine has long been regarded with no little suspicion in the treatment of persons suffering from renal disease, many practitioners refusing to employ it in any case associated with recognizable renal disease.

Washburn,<sup>9</sup><sub>July 11</sub> <sup>202</sup><sub>Aug. 10</sub> on the other hand, states that in his experience this drug has not been in any manner dangerous, but rather beneficial. Its action in allaying spasm of the arterioles, and thus diminishing the peripheral resistance to the circulation, tends directly to diminish the liability to convulsions, headache, and dyspnœa. It further is of value, according to some authorities, as Sfubini, in increasing the urea excretion, although this is not universally admitted. He states that morphine will not, either in

acute or chronic Bright's disease, add to the dangers already existing, but will uniformly produce happy results, and he quotes a large number of authorities in his support. The drug has undoubtedly been productive of fatal results in uræmia, but it is probable, in the face of the reports of observation being constantly made, that these are not entirely founded. However certain that many cases have succumbed even to the effects of ordinary doses when suffering from the effects of advanced renal disease, it is quite possible that, if given with caution and under the close supervision of the physician, the drug might exert a not unfavorable influence.

#### INJURY OF THE KIDNEY.

In the etiology of Bright's disease, while recognized, traumatism of the kidneys is rarely accorded special mention, although it probably merits a position quite as important as many of the slighter degrees of exposure to which are from time to time ascribed a causal relation. Odin<sup>228</sup><sub>July 16</sub> mentions a case of acute nephritis following eight months after an abdominal injury. After the occurrence of the injury symptoms of renal contusion were quite apparent, among them a hæmaturia, which persisted for four days, and intense pain and difficulty in micturition. Could it have been possible for the nephritis to have been the effect of this injury, so far separated in time from the former? Apropos of this case, he also details 2 cases communicated to him by Chevains, and a fourth encountered by Roussel in the author's term of service in St. Etienne's Hospital. In the last-mentioned case a man, after injury clearly involving the kidneys, from the existence of hæmaturia, pain and difficulty in micturition, was treated in hospital for some days, when he was discharged apparently cured, with no albumen in his urine. Nine months after he re-entered the hospital with all the evidences of an acute Bright's disease, without having been in any way exposed, or guilty of any imprudence. The other instances are equally suggestive, and the author places in a very clear light the possibility of a relation between the primary injuries and the cases of renal inflammation. Exactly how this connection is to be explained is perhaps but a question as yet; it may be that at the injury the epithelial or connective-tissue elements of the tissue may be so disturbed as to gradually undergo degeneration or proliferation, or it may be that

the injury determines a reflex hyperæmia. It is possible, too, that microbic elements may find an especially proper soil for their development in the tissues whose vitality and resistive power have been lowered by the effects of injury.

Dock<sup>112</sup><sub>Jan.</sub> mentions a case where a man, walking rapidly, fell from a platform to a pile of lumber, about five feet below, receiving the force of the blow on the left side, below the short ribs. Within an hour he began to be nauseated, vomited and passed urine, which became bloody at the end of the micturition. Deciding upon an expectant policy from the microscopical appearance of the urine and the estimated amount of blood in the excretion, the case progressed favorably to eventual recovery, no untoward symptoms being recorded, save a rigor about three weeks after injury, unaccompanied by rise in temperature. Dock refers to the views of Herzog,<sup>34</sup><sub>Nos. 11, 12, '90</sub> that in indirect violence the kidney lesion always involves the hilum, while direct violence leads to laceration of the organ. He believes that in the case mentioned the former of these lesions was produced. In another case mentioned by the same author, the man fell a considerable distance, receiving the force of the fall upon the back (more nearly direct violence to the kidney); and in this case the autopsy revealed a large, ragged tear in the right kidney. Campbell<sup>36</sup><sub>Feb.</sub> publishes the clinical records of 2 cases of rupture of the kidney, in 1 of which he was able to corroborate the diagnosis by an autopsy. In this case the injured man had been standing by a taut rope used in shifting the position of a large steam-vessel in a harbor, when the rope gave way and struck him in the right side. After several days death ensued, and a large, wedge-shaped piece was found nearly cut out of the liver, and a deep and irregular gash cut into the kidney on its anterior surface. At the autopsy it was noted that already efforts at healing were rapidly progressing in both wounds.

#### ANOMALIES.

Wallace<sup>6</sup><sub>Aug. 1</sub> reports the discovery, in the body of a man dead from acute pneumonia, of an anomaly of position and formation of the left kidney. The right kidney was nearly double the normal size, and contained several small subcapsular cysts; the capsule peeled off readily. The left organ was found in the pelvic cavity behind the rectum, lying below the rim of the pelvis, in an oblique position,

divided into two distinct parts (upper and lower), each part provided with distinct pelvis and ureter. The ureters from these two parts united and formed a common duct before entering the bladder. The length of the ureters was from two and one-half to three inches. The two parts of the kidney were joined together by kidney-like tissue.

*Floating Kidney.*—Tuffier <sup>3</sup><sub>Sept. 16</sub> endeavors to classify, from a clinical stand-point and for purposes of diagnosis, the various cases of movable kidney into three forms: the *painful*, the *dyspeptic*, and the *neurasthenic*. Another class may be recognized where these may be more or less combined, or may have their symptoms to a greater or less degree masked by complications. The first of these forms is that most often encountered, and is marked especially by pains of varying character and intensity, and capable of variable explanation, directly referable to the region of the kidney. The second, the dyspeptic form, does not suggest the nature of the trouble so directly, but presents a more devious complexus of symptoms, which are to be referred rather to the gastro-intestinal symptoms, varying from slight dyspeptic symptoms to intense nausea, intestinal pain, and vomiting. The author endeavors to explain this class by the direction of displacement and the relation of the displaced organ to the stomach, but confesses the incompleteness of his proposition, and acknowledges the inexplicable nature of many instances. Finally, a number of cases present a peculiar and overwhelming predominance of nervous symptoms, and are to be classified as a separate group, the neurasthenic variety. The nervous symptoms are apt to be those of hypochondriasis or of hysteria; and in some instances, at least, have been entirely relieved by relief of the mobile condition of the kidney. Morris, <sup>1</sup><sub>Apr. 4</sub> in a clinical lecture, presented a woman with a wandering kidney, and performed the operation of nephrorraphy. He makes his incision from the last rib to the rim of the pelvis, first along the margin of the quadratus lumborum muscle above, then sloping anteriorly slightly below, the slanting line being intended so that when the kidney has grown fast in the wound it will not be pinched between the ribs and pelvis when the person bends toward the affected side. The organ, being found and stripped of its perinephral fat, was stitched to the margins of the wound, carefully dressed, and eventually the result was completely favor-

able. The lecturer called attention to the difference in application in the terms "floating" and "movable" kidney, the latter being used in connection with organs whose movements have been acquired in some means, the former in connection with congenitally movable kidneys,—those congenitally provided with a distinct mesonephron. Wallace<sup>6</sup><sub>Aug.1</sub> mentions a case of movable kidney in a laboring man aged 50 years, which became apparent about a year before, during an attack of influenza; the only injury which could have had causal influence had occurred about six years previously. An operation was declined, and a belt and pad were applied, but the result is not stated. Poirier<sup>7</sup><sub>No.17</sub> presented, before the Anatomical Society of Paris, a kidney (congenitally displaced kidney) receiving its blood-supply as low down as the point of bifurcation of the aorta, in whose upper part a large cyst had been formed. There did not seem to be any clear connection between the two conditions, although the ureter passed at a marked angle into the pelvis (there was no evidence of dilatation of either ureter or pelvis of the organ, however).

## TUMORS.

Von Eiselberg<sup>336 90</sup><sub>No.5 ; Mar.</sub> places on record a case of fibro-lipoma situated in the perinephral fat of the left kidney of a female aged 70 years. The tumor was firm, about the size of a child's head, and non-sensitive. It was removed, along with the kidney, by abdominal section. Cure in five weeks. A large part of the renal tumors recorded during the year are of a sarcomatous nature, but quite a number of instances of epithelial new formations have also been encountered. It is to be noted that the diagnosis of these renal tumors is apparently influenced by the nationality of the writers, and an element of doubt must thus be acknowledged as to the existence of the differences indicated by the reports. It would, perhaps, be unwise to call attention to this peculiarity were it a feature of but the present year's literature, but an examination of the records of several years immediately preceding this exhibits the same. Sarcoma is mentioned as occurring in a child between 3 and 4 years of age,<sup>61</sup><sub>Mar.21</sub> attended by rapid development and by metastasis to the liver, and followed by death in a few months. Wheaton<sup>105</sup><sub>Mar.1</sub> removed a large tumor, supposed to be a sarcoma of the right kidney, from a child 5½ years of age. The child did not survive the operation long.

Schmidt<sup>69</sup><sub>Mar. 19</sub> mentions the removal of a renal sarcoma from a child of 6 months of age, followed by recovery within three weeks. In the discussion of this case Hochsinger, of Vienna, brought out, as a diagnostic point between renal and splenic tumors (for which this tumor had been mistaken), the greater motility of the latter, and the fact that the greatest movement of the former is in an antero-posterior direction. Weaver<sup>787</sup><sub>Apr.</sub> records the occurrence of a renal sarcoma in a man aged 34 years. The tumor was first diagnosed as a cancer, but this was reversed by the post-mortem examination, the microscopic diagnosis being made by Formad, of Philadelphia. The author states, however, that there was an undoubted mixed appearance, and records the existence of a cancerous history in the patient's family. Bell and Johnston<sup>282</sup><sub>Feb.</sub> report the discovery of a large tumor of the left kidney of a woman aged 39 years; the kidney was apparently not directly involved, although intimately connected with the growth. It is regarded by the latter of these writers as an adenoma, and is suggested to be due to growths from an aberrant supra-renal tissue, which the histology of the tumor closely resembled. It was partly degenerated in the interior; many of the epithelial cells were seen to contain fat-globules, and the sac of the tumor had a strong faecal odor, but was not connected with the interior of the bowel. It was, however, adherent to the ileum. The patient was in a septic condition when operated upon, and succumbed shortly after the operation. No evidences of metastasis were found, nor was there any appearance of a cancerous change in the histology of the tumor. Horn<sup>34</sup><sub>June 30</sub> demonstrated two very similar tumors before the Greifswald Medical Society, both having the structure of adenomata of the supra-renal body. The first was to be seen as a large tumor (encapsulated tumor), here and there breaking through the capsule, extending from the renal pelvis about and through the surrounding muscular substance and involving the abdominal aorta. Histologically, it was formed of large, cubical, epithelial cells, often filled with fat-droplets, with considerable fibrous growth, apparently derived from the renal interstitial substance. The second was a tumor removed by operation, involving the renal parenchyma, with degenerative central changes advanced, and histologically presenting the features of a carcinomatous adenoma of adrenal structure. Cancerous tumors of the kidney are mentioned by Fieux,<sup>188</sup><sub>May 28</sub> Levrand,<sup>188</sup><sub>June 21</sub> Brault,<sup>3</sup><sub>June 17</sub> and by

Lunn.<sup>2</sup>  
Feb. 17 The first was removed from an adult by a transperitoneal section, the supra-renal body, kidney, and tumor being removed *en masse*. The tumor was found to involve the greater part of the kidney, only a small portion of normal renal structure remaining at the lower part of the organ. Histologically, the cancerous nature of the neoplasm was determined. The patient recovered from the operation, and no symptoms of metastasis are recorded. The case mentioned by Levrand is a very interesting one, occurring in a man 59 years of age. It was of very rapid development, marked by pain in the hypogastrium, hæmaturia, and a sense of indefinite weight and pain in the lumbar region. At the autopsy an enormous left kidney was found, bosselated, soft, and infiltrated throughout with cancer. A large amount of pus escaped on section, and in the firm parts there were a number of sinuous pockets. The right kidney was normal, but on section a small purulent focus was found. The bladder was atrophied, the walls thick, inner surface corrugated; and upon the anterior surface a swelling was found which contained pus. All the pelvic and mesenteric glands were swollen. It must be questioned whether the vesical swelling could have been the point of origin of the renal tumor, although this is not probable; it is possible, however, in spite of the denial by M. Pousson in the discussion of this case, who stated that generalization of the tumors of the bladder does not occur, as that organ is not supplied with lymphatics,—clearly a mistaken assertion. The specimen reported by Lunn was removed from the body of a man aged 57 years, symptoms referable to the condition having existed for six years. The kidney of the right side was replaced by a tumor-mass weighing  $4\frac{1}{2}$  pounds (1235 grammes). The renal vein presented an extension of the growth toward the vena cava, but there were no perforations of the capsule except at the hilum, where two bossy masses projected through the capsule, which seemed to have commenced as intra-venous growths. The opposite kidney contained one secondary deposit about the size of a walnut. None of the other organs contained metastatic formations. Histologically, the growth was a very soft carcinoma. Brault<sup>3</sup>  
June 17 contributes a paper in which, after narrating a case of renal cancer, he applies himself to the question of the generalization of these tumors of the kidney. The instance mentioned was met in a man of 41 years of age, a painter,

without any especial features bearing on the subject in his family or previous personal history. The notable element in his own case was the absence of the usual signs except lumbar pain, which was abnormally preponderant. Even after an exploratory operation the true character of the case was not absolutely determined, and it was only established at autopsy that there existed a renal cancer.

From the undue intensity of the pain and the absence of tumefaction and hæmaturia, Brault is disposed to apply the term "painful form" to such instances as are similar. Taking up the question of the generalization of these tumors, the author mentions 2 instances of early metastasis,—1 giving rise to a secondary tumor of the spinal membranes, the other giving rise to local metastasis. He discusses the question of the rapidity of generalization, indicating his belief that the usual lateness or entire absence of metastatic tendency is due to anatomical features in the tumor and organ in relation to the body in general. The duration of renal cancers he places, at an average, at somewhat more than three and one-half years. As is well understood, cancer of the kidney is generally a unilateral affection usually beginning at one end of the organ and gradually extending evenly through the organ, beneath the capsule. This latter is apt to become thickened, forming a decided barrier to the extension of the new growth, and causing the tumor to assume, in a general way, the gross outline of the kidney. Eventually, the cells find a means of conveyance to other portions of the organism by breaking into the veins, large and distinct areas of growth being sometimes found invading the inner coats and occupying, to a greater or less degree, the lumen of the renal vein.

Sometimes it is difficult to appreciate the mode of transmission, and the author reminds one of the possibility, which was pointed out recently by Lejars, of metastasis by the vessels and lymphatics passing from the kidney through its fatty capsule. The author insists upon the true epithelial nature of these new growths, and refers their cells to the epithelial cells lining the convoluted tubes for their origin, the secondary nodules being made up of precisely the same cells, often arranged to more or less simulate the tubular structure of the organ in which they originated.

## CYSTS OF THE KIDNEYS, ETC.

*Hydatid Cysts.*—Chibret<sup>7</sup><sub>No.17</sub> reports the discovery of a hydatid cyst of the right kidney, in which the wall was more or less calcified; in a few places, on section, he had found areas of true ossification, presenting a Haversian system. It is exceedingly interesting to note this latter feature, true bone formation being rare in any part of the body, particularly in connection with the calcareous deposits in degenerative tissues. At the Clinical Society of London, Fenwick<sup>6</sup><sub>Mar.7</sub> presented a man who had a large renal tumor of thirty years' standing, and had passed hydatids by the urethra for the last five years. He presented another man, aged 57 years, who occasionally passed as much as 8 ounces (250 cubic centimetres) of hydatid cysts, the periods of passage being marked by definite prodromal symptoms. These consisted of numbness in the testicles, increasing to pain; then the pain passed to the kidney, remaining for about eight or 10 hours, when it would cease, to be followed by the passage of the hydatids. In this instance, the hydatid tumor must have suppurated, as, after attaining some size, the urine began to contain pus, small cysts, bacteria, and crystalline deposits; and after the urine cleared up the renal tumor had diminished in size. Schnell<sup>46</sup><sub>Mar.30</sub> mentions an instance of hydatid tumor of the left kidney in a woman of 38 years of age, whose presence was recognized by the passage through the urethra of a number of the hydatids, after symptoms of ordinary renal colic. The woman was in the habit of fondling a small dog, and it is supposed that the disease was derived in some manner from this animal.

*Congenital Cystic Kidneys.*—Fussell<sup>9</sup><sub>Jan.10</sub> mentions a case in which the abdominal wall of an unborn child had to be cut, the child eviscerated, and the kidneys moved into a position of one higher than the other in the child's axis in order to permit of the birth. Each kidney was made up of an enormous mass of cysts, varying from microscopical size to that of a small nut. On microscopical section there could not be recognized any remaining renal structure, the intercystic substance being composed of a firm fibrous tissue.

*Large Polycystic Kidneys.*—That many, and perhaps all, of the following cases should be considered with the last paragraph is undoubtedly true, but it is deemed best not to attempt to make

a hard and fast classification of all large polycystic kidneys, the large, fine, renal cystomata, as congenital in origin. Kerr<sup>77</sup><sub>Dec., '90</sub> reports an instance occurring in a man of about 40 years of age, who came under treatment for the effects of a drinking bout from which he succumbed without any marked urinary symptoms. The kidneys were enlarged, and, on section, presented a tissue made up of a mass of cysts, giving the organ a honey-combed appearance. The cysts varied in size from that of a pea to that of a small nut. From examination of the structure the author states that the essential change appeared to be an overgrowth of the tubules with their lining epithelium, the latter having a columnar shape in one cyst examined. This confirms the views of Bristowe, who believes that these cysts originate from the distension of sections of the uriniferous tubules, with atrophy and occlusion of the intermediate portions. Between the cysts the interstitial substance was firm and fibrous. Cases of very similar nature are recorded by Buckley<sup>2</sup><sub>Mar. 7</sub> in a woman aged 42 years, death occurring in uræmia, and by Boquel<sup>7</sup><sub>No. 9</sub> in a woman aged 45 years, dead after an apoplectic stroke, who had never exhibited any symptoms referable to her kidneys, but whose kidneys were found to contain a large number of cysts, especially numerous in the cortical portion of the organs, on the anterior and convex surfaces, and filled with a clear liquid or with a slightly colored, somewhat gelatinous liquid. So, too, the specimen presented before the Royal Academy of Medicine of Ireland, by Franks,<sup>16</sup><sub>Feb.</sub> a kidney weighing over 2 pounds (960 grammes), the seat of a conglomerate cystic formation, involving the entire organ, was, by a number of persons who witnessed it, regarded as a congenital polycystic kidney, although its fellow was recognized to be normal. Franks looked upon it as a true degenerative process of extra-uterine, probably of adult, life. The organ was removed by surgical operation from a woman aged 25 years; the patient made an excellent recovery. Touche<sup>7</sup><sub>No. 7</sub> records the occurrence of double multiple cystic kidneys in a man aged 76 years, dead from an acute pneumonia. Upon entrance to the hospital, a few days before death, there were absolutely no symptoms referable to the kidneys, and the urine was free from albumen and apparently entirely normal. Laffaret<sup>188</sup><sub>Feb. 1</sub> reports the case of a man who died in uræmia, having been picked up on the street in an unconscious condition by the police. At the autopsy

the kidneys were found very much enlarged, and the seat of a great number of small superficial cysts, some filled with a clear liquid, others by a reddish substance. Curiously, at the apex of the right lung several similar vesicles were found. Levrand<sup>188</sup><sub>Sept. 20</sub> reports a case of large polycystic kidneys, double-sided, from a man aged 47 years, who, before his death, presented, as symptoms of his renal condition, lumbar pains, slight œdema of the lower extremities, a gradually increasing albuminuria, and hæmaturia. The kidneys removed at autopsy were enlarged and each the seat of a number of large cysts, these containing a clear, serous liquid. Ozoux<sup>188</sup><sub>July 6</sub> presented before the Medical and Physiological Society of Bordeaux, for Vergely, the kidneys of a man, dead, under the care of the latter, from uræmia. The urinary examination pointed to contracted kidneys, and this change was found post-mortem; but the organs were also enlarged and the seat of a large number of small cysts filled with clear fluid, probably of secondary formation. Another case of unquestionable secondary origin is mentioned by Commandeur,<sup>211</sup><sub>Apr. 6</sub> where the kidneys were hollowed out by a number of cysts of variable size, and the pelves of the organs each contained a number of calculi. Before death the patient, a woman, complained of intense pain in the left lumbar region, and the diagnosis of calculous pyelitis was made, but the presence of calculi also in the right organ was unrecognized.

*Hydronephrosis.*—Lannois<sup>211</sup><sub>Nov. 30, '90</sub> mentions an instance of hydronephrosis, occurring in a young man, in which there seems to be a congenital factor of causation. The tumor apparently (to a certain extent) followed a fall, but when the patient was but a day or two old the father had had occasion to call the attention of the physician to the enormous size of his abdomen, and this had never entirely disappeared. When he came into the service of Lépine, in whose wards the author encountered the case, the tumor was of enormous size, filling up the whole right side of the abdomen, the hypogastrium, and a part of the left iliac fossa. The fluid was partially withdrawn by aspiration, but filled up presently again. The case was brought before Poncet, who decided upon a removal of the entire mass by a transperitoneal operation. The incision was made over the most prominent part of the mass (in the right side), 15 centimetres (6 inches) in length, the contents of the sac, 7500 cubic centimetres (2 gallons) of liquid, removed through a large cannula,

and the sac dissected from its attachments and removed after ligation of the renal vessels and ureter. The specimens were exhibited and reported upon by Tillier.<sup>211</sup><sub>Jan. 18</sub> Robinson<sup>2</sup><sub>Feb. 21</sub> reports a case of dilated ureters, with a possible slight dilatation of one kidney, in a small boy. The child had been wetting his clothes at first only in day, but later both during day and night, and complained frequently of pain in the back and lower part of the abdomen. On examination with a sound, under an anæsthetic, the bladder-walls were found rough and resistant; while the patient was anæsthetized, circumcision was performed, the physician suspecting his tight prepuce as an element of cause in the case. The child died, several days later, from the effects of the operation upon his already weak constitution, and at the autopsy the bladder was found very much diminished in size, with thick walls, and with ureters and kidneys as above mentioned. The constriction at the mouth of the ureter, from the overgrown connective tissue in the bladder-wall, was probably the point of origin of the hydronephrosis, although the author records it as probably of congenital origin. Angier<sup>220</sup><sub>Sept. 9</sub> publishes a case of hydronephrosis in a woman, aged 42 years, who had for six or seven years presented symptoms referable to such a condition. In 1884 she had submitted herself for the relief of intense pains, in the right flank shortly after an intense metrorrhagia, and on examination a large amount of decomposing blood was found retained because of incompletely-perforated hymen. The blood having been cleared out, pus was found to be passing from a small opening in the right side of the uterine cervix, and this was treated by antiseptic solutions for some time until the purulent discharge ceased. In 1887 she again had an acute attack of renal pain, accompanied by uræmic symptoms, from which with appropriate care she recovered. In 1890 another attack, with a relative anuria and with uræmic symptoms, occurred, and the physical symptoms of a hydronephrosis became manifest. Lumbar nephrotomy was performed, but little urine was withdrawn, and in a few days the woman was dead. At the autopsy it was found that there was but a single kidney,—the left,—and this was enormously enlarged; the ureter, pelvis, and calices were dilated, and at the lower end of the ureter was an obstructing calculus. The uterus was found to be bicornuate, the left uterine body pressing upon the ureter. This pressure determined the dilatation of the

ureter, led to the retention and agglomeration of renal sand, from which eventually the calculus was formed, and the hydronephrosis developed.

Coats<sup>213</sup><sub>May</sub> publishes the description of a hydronephrotic kidney in which the obstructive cause was a small branch of the renal artery, which crossed the ureter a short distance from the insertion of the latter into the pelvis, causing an angle in the course of the ureter and producing obstruction. As the pelvis and the upper part of the ureter became more and more dilated, the constriction became more marked and the condition more permanent. The opposite kidney was very much hypertrophied, indicating that it had been performing double function for a long time. He also calls attention to the existence, in the museum of the Western Infirmary of Glasgow, of 2 specimens of hydronephrosis in which the cause was the angular insertion of the ureter into the pelvis of the kidney, above the apex of the pelvis; such a cause is denied by certain authorities. Morienville<sup>230</sup><sub>Oct.</sub> met a case of rapidly developing hydronephrosis, the symptoms from which suggested a localized peritonitis, and, for a time, the diagnosis was uncertain. A sudden feeling of yielding in the abdomen, followed by profuse micturition and the disappearance of the tumor, led to the determination of the existence of a hydronephrosis, and subsequent examination revealed the fact that the affected kidney was a movable one. The latter condition was regarded as the underlying etiological factor, although it is quite possible that the movability was developed in consequence of the increased bulk and weight of the organ. This case occurred in a woman of 30 years of age, married and the mother of several children. The uncertainty of diagnosis, and the sudden disappearance of the abdominal tumor after a feeling of breaking within the abdomen, with the passage of large amounts of urinary fluid, led to the narration of a very similar instance by Bernard,<sup>230</sup><sub>Oct.</sub> occurring in a man of 42 years of age. He is unable in this case to indicate the cause of the trouble. A case of intermittent hydronephrosis was found after extirpation, by Israel,<sup>69</sup><sub>Feb. 19</sub> to be due to a reversal of the beginning of the ureter of several centimetres' extent. The ureter was imbedded back of the pelvis, the mouth of the latter pointing back and upward, the ureter then curving into the proper direction. Symonds<sup>2</sup><sub>Jan. 24</sub> reports 3 cases of hydronephrosis and their treatment. The first was in a young

girl, and had existed for some years, having been aspirated several times. At operation the kidney was laid open and drained; no calculus was discovered, but the ureter was found much dilated. No good resulting from this operation, some months later the kidney was removed, recovery ensuing. The second occurred in a housemaid with movable kidney. A primary operation—stitching the kidney in place to prevent kinking of the ureter—proving of no value, the kidney was removed, with result in recovery. The third case was an intermittent one, in a boy of 9 years, following, with a number of other disturbances, a severe injury from being run over. It had been tapped several times, but regularly returned. A case operated upon with success by abdominal section through the linea alba is mentioned by Terrillon.<sup>17</sup><sup>26</sup>  
Jan. 15; Mar. In an article upon nephrectomy, Fowler<sup>1</sup>  
Feb. 21 mentions a case of hydronephrosis in a young woman upon whom the operation of removal of the kidney was successfully performed. The case was one of Woolley's, and this latter gentleman<sup>1</sup>  
Feb. 14 takes exception with Fowler's view of congenital hydronephrosis, and states that, from his detailed study of the case, he is led to believe that the pathological condition was the result of extension of a chronic cystic inflammation along the ureter, producing obstruction and pyonephrosis, the contents of the dilated pelvis and ureter being purulent in a degree.

*Pyonephrosis.*—Ricketts<sup>53</sup>  
June 6 reports a case of renal abscess in a woman of 39 years of age, in whom the symptoms presented were: painful micturition, pain in the region of the bladder and right kidney, loss of flesh and strength, anorexia, constipation, pyuria, and the necessity for frequent micturition at night especially. On local examination the kidney was found slightly enlarged and tender; an exploratory opening was made, the kidney incised, the pus evacuated; and as there had been relatively little kidney-tissue destroyed the surgeon anticipated the healing of the abscess without necessitating nephrectomy. In these cases of pyonephrosis, as well as in any other condition demanding incision into the renal parenchyma, an unnamed writer<sup>122</sup>  
Jan., Mar. urges that incisions freely made by means of a bistoury, from the convex surface of the organ toward the pelvis, are the least perilous, the bleeding being easily controlled by simple pressure of the cut surfaces together, and in conditions of asepsis healing readily after suturing the edges of the wound together. He mentions several instances in human surgery

showing the rapid tendency to heal under these circumstances,—one in a kidney relatively normal, the other in a tubercular organ. Experiments upon the normal kidneys of the lower animals show a marked tendency to heal on the part of such renal incisions. The sutures are to be placed boldly and firmly in order to produce the proper coaptation.

*Perinephritic Abscess.*—A case of perinephral abscess is reported by Brunet<sup>188</sup><sub>June 7</sub> in a man of 64 years of age. From early in life he had complained of lumbar pains, and had had neuralgic pains in the back of the limbs from time to time. Several years before his death he fell down a tramway, striking upon the left side; and a year or more later severe pains in the left flank appeared, followed by a fluctuating tumor, extending from the crest of the ilium nearly to the spinal column, which was opened, pus evacuated, and from which a sinus resulted. The patient sank rapidly and finally died in an emaciated, weakened condition. The left kidney was found surrounded by pus, very much diminished in size, and contained several calculi. It is believed that these calculi were the point of origin of the disease, leading by their irritation, together with pyogenic infection, to the determination of a pyonephrosis; this latter gradually extended beyond the kidney and produced the lumbar abscess, resulting in compression and destruction of the kidney, and in the formation of the lumbar sinus mentioned. Le Dentu<sup>24</sup><sub>Nov. 1</sub> brought before the class a young man with a fistula in the right lumbar region, which he stated had resulted from opening an enlargement appearing during a recent attack of typhoid fever. The lecturer questioned the diagnosis of typhoid fever, suggesting that it was rather the febrile disturbance of a septic condition. The cause of the deep lumbar swelling, which was clearly perinephritic, he ascribed to a probable gummatous deposit in that region. Enlargement of the sinus, the formation of a counter-opening, with thorough drainage, constituted the course of treatment. A case quite similar is reported from St. Thomas's Hospital, under the care of McCormac,<sup>22</sup><sub>June 10</sub> in a large, stout woman of 35 years of age, who was in a hectic condition, with high night-temperature, and great pain with distinct swelling in the right groin. On cutting down nothing abnormal could be detected in the kidney, but the perirenal tissues were widely infiltrated, and the removal and examination of a bit

of this led to the recognition of the gummatous nature of the swelling.

*Kidney Containing Gas.*—Le Dentu<sup>3</sup><sub>Nov. 4;</sub> <sup>164</sup><sub>May 7;</sub> <sup>127</sup><sub>June 12;</sub> <sup>673</sup><sub>July</sub> reports the discovery of a peculiar occurrence in the removal of a calculous kidney from a patient. The organ was resonant and gave rise to a crepitation or gurgling on pressure, revealing the presence of gas in the tissues. A chemical analysis of the gas showed it to be composed of nitrogen, oxygen, and carbonic acid. The kidney was removed intact, and it would have been impossible for the gas to have entered the organ except from the blood or from decomposition of the tissues. The absence of hydrogen and sulphuretted hydrogen precluded true putrefaction. The proportions of the constituents of this gas differed from those of the gas which is derived from the blood; the author is, however, inclined to believe that it was in some way derived from the blood,—how, is unknown. This case recalls one recently met by the editor of this department, in which the vessels, arteries, and veins of the brain, and, to a less degree, of the rest of the body, were full of bubbles of gas. The man was brought into the hospital in an unconscious condition, and died in a few hours; he had been seen the day previous in an exceedingly drunken condition, and the stomach showed slight evidences of irritation, but nothing suggested other toxic substance than alcohol. The man was a carpenter, working upon a large grain-elevator, and was not in any position to have been in excessively dense atmosphere. A small amount of the gas was collected for examination, but an unfortunate accident caused the breakage of the tube containing it after it was too late to collect more.

#### TUBERCULOSIS OF THE KIDNEY.

There has been very little confidence on the part of the profession in accepting the possibility of transference of the tubercular infection from the lower urinary or genital passages to the upper genital or urinary tracts. Clinical evidence, perhaps, indicated a slight chance of generalization in this manner, but there has always been but a doubtful reception of even this slight chance. Albarran<sup>3</sup><sub>May 27;</sub> <sup>14</sup><sub>May 27;</sub> <sup>55</sup><sub>June 20</sub> has recently experimented upon this subject by inoculating into the ureter of a rabbit a pure culture of tubercle bacilli, and then ligating the ureter. Following such a pro-

cedure a number of tubercular nodules were found developing in the kidney, pelvis, and calices. The author states that it is easy to follow, under the microscope, the ascending progress of the bacilli along the canals, and the alterations they cause. One other interesting result was the existence, along with the tubercular changes, of a diffuse nephritis, partly catarrhal and partly interstitial, with thickening of the vascular walls. Besides the tubercular changes localized in the kidney, the process was found generalized to the mediastinal ganglia, to the hip-joint of the same side, and the kidney of the opposite side. Steinheimer<sup>34</sup><sub>Jan. 6</sub> reports a case of apparently primary tuberculosis of the uropoietic system in a man of 56 years of age, who had felt quite well up to nine months before, and from that time only had he complained. Suspecting, from the pain at micturition, the urgent frequency of the act, and the presence of pus and other elements, that possibly a vesical calculus was at the bottom of the affection, epicystotomy was performed; no stones were found, and within two weeks the patient died. At the autopsy two tubercular nodules were found in the bladder-walls, with some ulcerative changes. The right ureter was converted into a hard, fibrous band, of the thickness of one's finger, with its mucous surface in a cheesy, degenerated condition. The right renal pelvis was full of detritus and ulcerated, the renal papillæ were shrunk, and the kidney was the seat of a number of cheesy masses. The left ureter was normal, and the kidney slightly enlarged, but practically normal. The prostate was in a state of beginning degeneration. Unfortunately for the statistical value of the case, examination of the rest of the body was not permitted; but there had been no positive signs of tuberculosis in any other parts. Faulds<sup>787</sup><sub>Apr.</sub> reports a case of renal tuberculosis in a young man of 21 years of age, the first symptoms of which manifested themselves a short time after an injury received while playing football, a companion falling upon and striking him in the left lumbar region with his knee. The prominent symptoms were: pain on micturition, hæmaturia (not constant), pyuria, loss of strength and flesh, and tenderness over the left kidney. An explorative operation was performed by Bryant, of New York, who found the left kidney enlarged, and so firmly bound down by fibrous tissue that he declined to remove it. Death followed in several months, and the autopsy the organ was found in an advanced tubercular casea-

tion ; the opposite kidney contained a few tubercular nodules ; the mesenteric glands were enlarged and cheesy ; the spleen contained a few scattered tubercular nodules ; and at the apex of the left lung there was a small cavity. The writer looks upon the case as one in which the injury mentioned acted as a potent factor in determining the disease. It seems not improbable, however, that the primary tubercular focus was not located in the urinary organs, as there are no evidences recorded of the mode of entrance of the infection to the kidney.

A case in which the post-mortem findings were identical with many of so-called renal tuberculosis, secondary to tuberculosis of the lower urinary tract, is mentioned by Finley<sup>282</sup><sub>Aug.</sub> as the reverse. The kidney was in an advanced caseated condition, especially the cortical portion, and in the opinion of the author the ureter and bladder had been secondarily invaded from infection by the tubercular urine. The earliest symptoms were frequent and painful micturition, at first without pyuria, later with the latter ; nothing is stated as to the conditions of the rest of the organs. An enlarged cheesy kidney, from the body of a boy between 2 and 3 years of age, was exhibited before the Manchester Pathological Society by Railton.<sup>2</sup><sub>Jan.10</sub> The enlarged left kidney was first brought to notice when it had reached a large size, and at the same time tubercular lesions were noted in the pulmonary apices. There were no abnormal elements present in the urine, but at the autopsy the cause for this peculiarity was found in the complete closure of the ureter by the inflammatory changes in the structure. The kidney was found very much enlarged, and cheesy throughout ; there were distinct tubercular changes in the apices of the lungs, the left containing a small cavity. The immediate cause of death was tubercular meningitis. The author believes that he may conclude, from the appearance of the tissues, that the renal changes far antedated those of the lungs. Cases of cheesy tubercular kidneys, presenting the usual clinical features and post-mortem appearances, but unaccompanied in the reports by records of the condition of the other organs, and hence, also, of no statistical value, are mentioned by Wheaton<sup>105</sup><sub>Jan.1</sub> and Allen.<sup>9</sup><sub>May 28</sub> In the last instance, an operation for the removal of the diseased organ was attempted by Roberts, of Philadelphia, but abandoned because of the moribund condition of the patient. Frisch,<sup>57</sup><sub>July 12,19,26</sub> having met with a number

of cases of urinary tuberculosis, has contributed a paper upon the diagnosis of tuberculosis of the urogenital system. The symptoms, exclusive of the presence of tubercle bacilli in the urine, are of very variable character and occurrence, and, therefore, never can be thoroughly relied upon for their significance. Even the occurrence of tubercle bacilli is not to be regarded as an absolute sign, since it has been demonstrated that in tuberculosis elsewhere than in the urogenital system the urine and the sperm may contain bacilli. The author states that the discovery of bacilli in the urine is apt to be attended with difficulty both from the scarcity and the massive numbers to be encountered in different (or even in the same) specimens, at different examinations. One occurrence of the bacilli, that in which they are arranged in S-shaped groups, is especially valuable as a diagnostic sign of a urinary tuberculosis, but it is possible that even in such groups the tubercle bacilli may find their way into the urine from more distant tubercular foci. Nevertheless, these groups are more apt to come from masses of bacteria in close contact with the urine stream. In examining the urine for tubercle bacilli the author mentions the methods suggested by Kirstein,<sup>69</sup> Biedert,<sup>4</sup> Sehlen,<sup>50</sup> Wendriner,<sup>297</sup> and that of Philip.<sup>36</sup> Some of these methods were originally suggested for the purpose of discovering the bacilli in sputum, but, with slight modifications, have been found well suited to urinary examination. In a general manner it may not be inappropriate to repeat several suggestions that the author makes in obtaining material from the urine which shall contain the bacilli. Where the urine contains large quantities of mucus he suggests that it be treated with an alkali to dissolve the latter, thus permitting the precipitation of the bacilli. Where the sediment is largely made up of urates and other crystalline substances he uses, after Wendriner, a solution made of hot distilled water in which is dissolved 12 per cent. of powdered borax, and afterward an equal amount of boracic acid added. This added to the urine dissolves the uric acid, urates, earthy phosphates, and other organized substances. The urine is permitted to stand until the sediment is deposited, then the supernatant fluid is poured off, the sediment washed with water and collected upon a filter, and a portion of this pressed (but not rubbed) between two covers, dried, and stained just as sputum would be.

Fenwick<sup>2</sup> presented before the Pathological Society the

urinary system of a man, aged 32 years, who had for two years presented symptoms of reno-vesical tuberculosis, but the bladder as shown exhibited very slight ulcerative change. As the urine was found to contain bacilli and indicated the involvement of the kidney, operative procedures were not pursued, but Koch's fluid was administered in the usual way. There occurred a marked reaction, and next day profuse hæmaturia, vomiting, and fever set in, and the patient died in several weeks. Whipple<sup>6</sup> reports marked improvement in a case of renal tuberculosis from the employment of the same measures. An interesting article upon the influence exerted by the tubercular diathesis upon affections of the genito-urinary system is published by Englisch,<sup>57</sup> Mar. 29, Apr. 6; June 20<sup>84</sup> in which this influence is classified in the manner in which the tubercular process is engrafted upon the urogenital condition, as a tubercle-forming process, as a caseating change, etc.

#### PYELITIS, PYELONEPHRITIS.

Rendu<sup>17</sup><sub>Oct. 8</sub> brought before his class, as a clinical subject, a young man of 29 years, who complained of occasional pain in the region of the kidney, of intermittent pyuria, and the usual signs of pyelitis. No crystals were found, but the history of the primary attack was one of intense renal colic, and evidently due to the passage of a small calculus from the pelvis of the kidney into the bladder. This view of calculous pyelitis was sustained by the exclusion of the ordinary infectious form, from an ascending urethral or vesical affection, and the constitutional or tubercular form. The patient was placed under preparatory treatment with a view of operative procedure, antiseptic agents, as the balsams, being also employed. A case of calculous pyelitis is reported by Reymond<sup>7</sup><sub>No. 15</sub> in a woman in whom the existence of a hydronephrosis was determined in the right kidney. Nephrotomy was performed and a calculus weighing 6 grains (0.39 gramme) removed from the apex of the distended pelvis. It was composed of phosphate and oxalate of calculus. The woman passed, shortly after, into a uræmic condition and died. At autopsy the bladder was found unchanged, the left ureter normal, the right dilated, the right pelvis distended and inflamed, the right kidney represented by a mere shell.

A case of pyelonephritis in the kidney of a cow is commented

upon by Bollinger.<sup>34</sup><sub>July 7</sub> The cause of the affection is a special form of bacterium, a bacillus several micromillimetres in length, described by Enderlen. Whether the affection is the result of infection along the female genital and urinary tracts, or whether the micro-organisms find their way into the kidney by way of the blood, is unknown. Vergely, the younger,<sup>188</sup><sub>May 2</sub> reports a case of pyelonephritis, probably from extension from the bladder, in a man of 32 years, who came into the hospital for relief, but who was refused operation because of his almost moribund condition. A distinct tumor could be made out in the left lumbar region, and after death; which followed in a few days, the kidney was found enlarged and drawn from its place downward, displacing the pelvic intestine. Sainton<sup>7</sup><sub>No. 10</sub> publishes a case of double pyelonephritis in a boy of 15 years of age. When a child he had had incontinence of urine, and at 11 years of age he had had electrical applications made, at one of the hospitals, along the urethra. Following this the symptoms of cystitis became pronounced in the lad, and the renal affection ensued as a consequence of the upward extension. The urine was passed drop by drop, clear and purulent. There was tenderness in the left renal region, and the right kidney was enlarged and painful. The child eventually died in a uræmic condition; and at the autopsy the right kidney was found very large, soft, and adherent. The left kidney was also quite adherent, but not so large; the ureters were very much dilated, and the bladder was small, with thickened walls. On section of the kidney the calices and pelves were found much enlarged; the renal tissue was reduced to a thin shell, of fibrous appearance. Every part was full of pus. Shepherd and Johnston<sup>282</sup><sub>Dec., '90</sub> record the case of a man, of 33 years of age, whose kidneys were both the seat of suppurative pyelonephritis, which was the result of a gonorrhœa contracted fourteen years before. A dense stricture, for which the operation of external urethrotomy was performed, followed, but from time to time the stricture became almost if not quite impervious. The bladder became involved, and, after a time, the kidneys, in the manner indicated. Fromaget<sup>188</sup><sub>Nov. 30, '90</sub> records the existence of a double pyelonephritis in a man of 50 years of age. The left kidney was atrophied to about two-thirds its normal size, little else remaining but the cortex, the interior being occupied by pockets of pus; the ureter was

dilated. The right was of nearly normal size, but at the upper part showed some loss of substance. The origin of the condition is not indicated by the author. Robin<sup>31</sup><sub>May 14, June 4; Aug. 16</sub><sup>82</sup> contributes an article devoted to the diagnosis and treatment of pyelitis. For diagnostic as well as therapeutic purposes, the author divides the affection into three periods,—the acute, indeterminate, and chronic. In the first class belongs a variety—primary pyelitis—which is especially like typhoid fever in its manifestations,—marked in the beginning by headache, vertigo, malaise and fatigue, anorexia, and insomnia. Later, urinary phenomena become pronounced and diagnosis ready. In the second variety the general symptoms oscillate with the collection and discharge of pus, while in the last the symptoms are fairly regular and generally referable to the local conditions, save when uræmia is superadded. In the treatment of the condition in the first stage the primary indication is to diminish the pelvic inflammation by blood-letting or by intestinal revulsion. The blood-letting should be done in the triangle of Petit, the veins of the renal capsule here anastomosing with those of the lumbar walls. The author prefers leeches to wet cups. In acting on the intestines he prefers to give pills made of scammony and calomel rather than the salines. The second indication is to render the urine as aqueous as possible,—best accomplished by an absolute milk diet (skimmed milk, preferably). For the purpose of rendering the tissues more resistive to microbic influence tonics are required, for which purpose the author administers quinine and alcoholics in moderate doses. The treatment of the chronic forms is partly hygienic, partly therapeutic. The first of these heads includes such measures as increasing the functional activity of the skin, repose in bed, moderate exercise, prevention of chilling the surface. The diet is to be as unirritating as possible, milk being freely employed to render the urine limpid; all salt meats and game, all irritating and highly-seasoned food, all legumes, and all fruits are to be forbidden. The urine may be rendered aseptic by the use of balsams and benzoate of soda, all to be used in small doses. When benzoate of soda cannot be used on account of the stomach, balsam of tolu, Canada balsam, or balsam of copaiba may be used, or turpentine styrax and eucalyptol. Salol, borate of soda, boracic acid, and oil of Haarlem have also been suggested. As remedies intended to exert an astringent action on

the renal pelvis, gallic acid or acetate of lead may be employed. These should be used only in the later stages, when the other drugs have exhausted their action, and may be associated with tonics. In using counter-irritation the actual cautery and iodine are the preferable agents. In calculous pyelitis with hæmorrhage the author suggests, as the proper outline of treatment, a milk diet, benzoate of soda, with tannin or ergotine. Opium and belladonna may find service in allaying the pain.

Passing mention may, finally, be made of the essay on pyelonephritis by an anonymous author, published as competing for a prize before the Medical Society of Virginia. <sup>81</sup>Nov. The author considers the condition under the heads, traumatic, embolic, reflex from distant irritations depending on operations on the uterus, ovaries, or rectum, idiopathic, consecutive, in which the transference of inflammatory changes from the lower urinary passages is included, and chemical from irritants brought through the blood and urine, as copaiba, turpentine, etc. The essay is, in general, a review of the classical knowledge upon the subject.

#### RENAL CALCULUS.

A rather curious case of renal calculus is published by Graux, <sup>17</sup>May 30; <sup>112</sup>Aug. as occurring in a man who, after severe left-sided renal colic, passed a number of small uric-acid calculi *per urethram*. Later, the attacks became not at all infrequent, and were now on one, now on the other side. The patient, when first met, had quite a collection of small calculi, some uric acid and urates, while the others were made up of phosphates. After some years it was noted that the uric-acid calculi came from the right kidney, while the phosphatic came from the left. The change from uric acid to phosphatic formations on the left side is believed by the author to be due to the alkaline treatment which was administered. Germain Sée, <sup>31</sup>Jan. 8; <sup>202</sup>Feb. 10 in an article upon urinary calculi, discusses at some length the theories of their formation. He is unwilling to accept any view that a simple increase in the crystalline elements in the urine is alone capable of producing the formation of a urinary calculus. Nor does he accept, further, the existence of gout, or a so-called phosphatic or oxalic diathesis, as having any positive value as an etiological factor. From examination of renal calculi and from the results of the experiments of Ebstein and Nicolaier,

in producing urinary concretions of oxamid by feeding this substance to dogs and rabbits, the author is convinced that other elements than the simple deposit of salts enter into the process; there is an organized frame-work contributed on the part of the tissues indicating a more active agency than the mere separation of the excess of crystalline bodies from the liquid urine. The presence of a bit of formed material, a portion of degenerated tissue, urinary concretions, calcification of altered portions of the renal structure,—all are favorable to the formation of calculi, such particles acting as a nucleus for the growing stone. In this connection reference may be made to the studies in calcareous infiltration of the kidneys by Neuberger.<sup>41</sup><sub>Nov. 27, '90</sub> This author has experimented with a number of toxic substances upon puppies, and has come to the following conclusions: Marked calcification of the kidneys identical in character occurs after poisoning with corrosive sublimate, aloin, and bismuth. Slight changes of the same nature follow phosphorous poisoning, neutral chromate of potash, and a number of other less important agents. Oxalic-acid poisoning is marked by a decided deposit of oxalate of lime in the kidneys; it may be distinguished by staining with hæmatoxylon, a distinct color reaction occurring in the case of the carbonate and phosphate of lime. The calcareous deposits following the ligation of the renal artery for one or two hours is of quite similar nature to the changes just mentioned. Occasionally, it may be noted that, besides the dark substance, taking on a stain and apparently in combination with an organic material, arising in aloin and bismuth poisoning, there is also to be seen a glistening, limy deposit which refuses to take on any stain. In aloin and bismuth poisoning the deposit is met in the cortex of the organ; in phosphorus and chromate of potash, in the medulla; in oxalic acid, mostly in the cortex, but also in the medullary portion.

Poels,<sup>288</sup><sub>Dec. 14, 20, '90</sub> in a complete and excellent paper on the subject, after the narration of a number of clinical instances illustrating his views to the pathological anatomy of calculous kidneys, says that whenever a calculus is formed within the parenchyma or the pelvis of a kidney the peritoneum is quite apt to become the seat of a formative inflammatory process, and, as a consequence, adhesions are very common between these organs and neighboring viscera. Sometimes a purulent inflammatory process is lighted

up and, communicating with the surface, may give rise to a lumbar fistula or one opening in the inguinal region. So, too, occasionally communication is sometimes established with other portions of the body, with the peritoneal cavity, the intestines, bladder, or even the bronchial tubes. Rarely do these organs preserve their normal size, being either enlarged or shrunken, the enlargement being due, sometimes, to true hypertrophy, to fatty deposit, to collections of fluid or pus in the pelvis, the diminution being caused by a cirrhosis. Their color varies considerably from the relative degrees of fatty deposit, of vascular injection or of ecchymotic changes. The surface is often irregular, depending on the presence of calculi, of cysts, of purulent collections, of the regularity of fatty deposits, and similar elements. The pelvis is the seat of preference for calculi. The walls are either thinned or are thick and fibrous, and the external layers are loaded with fat. The calices are frequently invaded by calculous formation, the whole or part of the calculus occupying a calix. They may be distended and the walls are apt to be fibrous. The renal parenchyma may be entirely altered and absorbed; may be the seat of a hypertrophy, atrophy, of a parenchymatous or interstitial inflammation, or of cystic change. As to the calculi themselves, the author mentions, as examples of very heavy specimens, those from Pope Innocent XI, that from the right kidney weighing 180 grammes (5 ounces, 6 drachms, 18 grains); that from the left, 270 grammes (8 ounces, 5 drachms, 27 grains). Another instance mentioned <sup>126</sup><sub>p. 499, 776</sub> was of interest from the enormous size of the calculi, the largest weighing 1015 grammes (32 ounces, 5 drachms, 3 grains), and accompanied by a number of small ones weighing about 60 grammes (1 ounce, 7 drachms, 26 grains); the opposite kidney contained a calculus weighing 273 grammes (8 ounces, 6 drachms, 14 grains). The writer offers, as a means of classification, the shape and size as relating to the position occupied by the stones. Thus, he arranges them as follows: The largest (*a*) those occupying renal parenchyma, calices, pelvis, and ureteral opening; (*b*) those occupying the calices, pelvis, and ureter; (*c*) those filling the pelvis and beginning of the ureter; (*d*) those completely filling calices and pelvis; (*e*) those filling the calices and that part of the pelvis toward the calices; (*f*) those occupying the ureter and pelvis, the part toward the ureter; (*g*) the small ones scattered in the pelvis, (*h*) the calices,

and (i) the parenchyma. As an instance of the changes induced in the neighboring tissues by the presence of a pelvic calculus, Achalme<sup>7</sup><sub>Dec., '90</sub> reports a case of a large lipoma in the fatty capsule of a calculous kidney. In the same case were found a cancer of the cervix of the uterus and a myofibroma of its body.

Taking the subject in one of its complicating forms, as calculous anuria, Legueu<sup>100</sup><sub>Aug. 8</sub> contributes an analytical paper bearing particularly upon the prognosis of the condition unaided and when cared for. Of 56 cases (not operated on) chosen at random from literature, because of their possessing features of interest, 16 went on to spontaneous recovery (28.5 per cent.), while the other 40 (71.5 per cent.) died, the largest proportion after five or six days. Of the 40 which terminated fatally, 10 were not examined after death; of the others, 23 presented recent obliteration of one ureter and 7 showed one or more calculi in the pelvis capable of completely blocking the opening of the ureter. On the opposite side 3 kidneys were congenitally absent, 6 showed atrophy or some other change due to calculi, 14 various calculous lesions, 6 obliteration of the ureter, and 1 healthy kidney. From these cases the author concludes that anuria is not necessarily due to obliteration of the ureter, but that it may result from unfixed calculi in the pelvis of the kidney without these causing absolute closure of the ureter. As a rule, the opposite kidney is affected, although, in spite of the condition, it is, in a certain proportion of cases, capable of carrying on the function. Comparing the results of non-interference (a mortality of 71.5 per cent.) with those of surgical interference (11 cures out of 16 cases—66.6 per cent.), the value of treatment is insisted upon by the author. In operation the position of the calculus must determine in no slight degree the details and the exact character of the method. The author recommends the lumbar incision as in general the best, and the final decision of method must consider the question of ureterotomy simply, and the creation of a lumbar urinary fistula. As to the fairness of the statistics quoted by the author, there must always be a question where cases are chosen from a great number; the only satisfactory statistics include all available instances, and no other arrangement can be regarded as absolutely fair in estimating ratios of success or failure, or the proportions of life and death. With this objection the conclusions of the author are fairly drawn from

his material, and withal seem, in all probability, nearly, if not quite, correct.

In the treatment of renal calculi there are always those who press upon general notice the value of this or that solvent as a means of avoiding the dangers of surgical interference. This year this duty is performed by Bryce<sup>196</sup><sub>Nov.</sub> in favor of the water from the Buffalo Lithia Spring, in Virginia. The writer mentions several illustrative cases. Owen<sup>81</sup><sub>June</sub> states that where the calculus is far down in the ureter, near its opening into the bladder, it is possible, probably by some reflex nervous means, to hasten its passage by the introduction of a catheter into the prostatic part of the urethra. One case in which this was practiced, more by accident than otherwise, resulted so favorably that subsequent trials were made, also successfully. On the insertion of the catheter into the prostatic urethra there is intense pain, and this, it is believed by the author, is followed by relaxation of the ureter-walls and the escape of the calculus into the bladder. Several cases of renal colic are published by Allen,<sup>99</sup><sub>June 26</sub> in which he refuses to make any positive diagnosis of calculous presence because of failure to find any stone passed *per urethram* at any time afterward. In their clinical aspects these cases resemble in every way, in pain, vomiting, and relaxation, the typical cases of passage of stone along the ureter. The treatment in all of the cases was sedative and relaxant, and eminently successful.

Twombly<sup>282</sup><sub>Feb.</sub> records the existence, in the parenchyma of a horse's kidney, of a large calculus, weighing 27 ounces (839 grammes), together with two smaller calculi, each of  $\frac{1}{2}$  ounce (15.55 grammes) in weight. They were made up of oxalate, carbonate, and phosphate of lime; during life no symptoms referable to the condition had been noted.

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#### DISEASES OF THE BLADDER.

*Cystitis*.—The announcement by Krogius<sup>3</sup><sub>No. 31, '90</sub> last year, of the discovery of a certain form of bacillus in purulent urine, which he described and to which he applied the name *urobacillus liquefaciens septicus*, has called forth an article from Schnitzler,<sup>50</sup><sub>Dec. 11, '90</sub> in which he compares with the bacillus of Krogius one which he has himself found under similar conditions, and which he evidently regards

as the same form. This bacillus is a short (about three or four times as long as broad) rod, with rounded ends, stains fairly well with Gram's stain, and does not show sporulation. The author appends an extended description of its peculiarities of growth on various media; he states that, injected under the skin, it is followed by abscess formation, in this particular especially differing from the micro-organism as described by Krogus. Injected into the bladder, it is invariably followed by the establishment of an intense, purulent cystitis, even in cases which have resisted the action of the *staphylococcus pyogenes aureus*, regarded by Rovsing (see last year's edition of the ANNUAL) as the most frequent infectious cause of acute cystitis.

Bazy <sup>3</sup><sub>Apr. 3</sub> remarks that among the cases of cystitis said to be due to the action of cold, or owe their origin to rheumatism, not a few are really of an infectious nature. A patient may have a dental abscess, a purulent bronchitis, or, perhaps, a subpreputial suppuration, and is suddenly seized with vesical tenesmus, pollakiuria, terminal hæmorrhage, pyuria. Such a course of events he believes to be due to the passage through the kidneys into the bladder of masses of micro-organisms from the primary purulent focus. The work of Rovsing, mentioned in the last edition of this review, is referred to in several journals. <sup>50</sup><sub>Feb. 21</sub> <sup>26</sup><sub>Apr.</sub> This investigator regards cystitis as eminently a micro-organismal affection, due to several forms of disease germs, but to the staphylococci of suppuration in its most acute and suppurative form. Besides the acute suppurative variety, tubercular cystitis also is apt to be accompanied by more or less purulent change. In the simple catarrhal form the author refers the origin to certain anærobic bacteria without pyogenic power; these alter the urine, causing it to become alkaline. The introduction of bacteria into the bladder may occur, according to the author, by the urethra, by means of a catheter, or where a permanent opening exists, as in cases of bad stricture, through perforation of an abscess into the bladder, from the kidney, or from the blood. In an article dealing with cystitis among children, Baumel, <sup>17</sup><sub>June 2</sub> <sup>26</sup><sub>July, Aug.</sub> <sup>23</sup><sub>Sept.</sub> after mentioning such causes as gonorrhœa, phimosis, cold and prostatic lesions, gout, stone, mentions a case in which he found, after eliminating these causes, that the patient's father was epileptic and alcoholic, and had accustomed his child from an early age to drink pure wine. This

abuse of alcohol had induced, if not a renal sclerosis, at least deposits of uric acid and urates in the urine, causing, by their elimination, cystitis of the neck of the bladder. Godfrey<sup>760</sup><sub>Oct.17</sub> quotes malaria as being by no means an uncommon cause of irritability of the bladder. The abrupt and frequently periodical appearance of pollakiuria and painful micturition appear especially in the remitting form of malarial fever. It occurs more frequently in women than in men, and, on account of its transient character and the absence of local inflammatory changes, the poison is believed to operate through the nerves that govern the function of the bladder. Maboux<sup>48</sup><sub>June</sub> discusses the frequency of cystitis in women, especially the form supposed to be caused by gout. He comes to the conclusion that gout is more frequently a cause of cystitis than is usually thought. After mentioning 2 illustrative cases, he discusses treatment, in which connection he prefers salicylate of sodium and colchicum. The mineral waters, especially those with calcium sulphate, as Martigny, Vittel, and Contrexéville, are also of undoubted value. Belfield<sup>9</sup><sub>Dec.18,'00</sub> lays stress on the fact that cystitis, like jaundice, is a symptom rather than a definite disease. In support of this he produces 6 cases in which symptoms of cystitis were dependent on the following conditions: tuberculosis of testicles, seminal vesicles and prostate, hypertrophy of the prostate, tuberculosis of kidney, hypertrophied prostatic ring (internal sphincter), chronic inflammation of the posterior part of the urethra, and renal calculus. A case in which severe vesical symptoms were dependent upon the existence of a valve at the neck of the bladder is mentioned by Eigenbrodt.<sup>336</sup><sub>Oct.17</sub> The existence of such a condition is denied by many, but in this instance was recognized clinically and corroborated by operative results. Section revealed the positive existence of a fold of membrane acting as a valve over the urethral opening; it was removed, and the urgent symptoms of the bladder were at once and permanently relieved.

In the treatment of cystitis, whether purulent or not, Poulet<sup>33</sup><sub>July</sub> insists on the benefit of hippurate of calcium. He mentions a number of cases which yielded at once to the remedy; he administers it in doses of 3 teaspoonfuls of the syrup, given three times daily. Bryson<sup>245</sup><sub>Nov.</sub> advises the use of salicylic acid in some forms. In the discussion following this paper, Palmer, of Louisville, ex-

pressed satisfaction with this remedy, but stated that he considered Thiersch's solution of salicylic and boric acids as too strong, its application being attended with pain. Meynier<sup>243 211</sup><sub>Oct.; Oct. 18</sub> mentions 25 cases tending to prove that salicylate of sodium has a quick and certain influence on cases of hæmorrhagic cystitis, or those cases which are of gonorrhœal origin. He advises its administration in doses of 6 grammes (24 drachms), and repeats it. After several days' treatment improvement in the symptoms may be expected. Dunstone<sup>132</sup><sub>Sept.</sub> reports a very obstinate case of cystitis of some years' duration, the cause of which was probably the presence of vesical gravel. He treated the patient with the fluid extract of kava-kava,—a fluidrachm in a teacupful of lukewarm water, morning and evening,—with the result of a complete recovery. Wyman and Laval<sup>3 673</sup><sub>July 1; Aug.</sub> recommend the fluid extract of pichi (*Fabiana imbricata*, Chili) in cases of cystitis, whether acute or chronic. While the authors readily commend its employment in all forms of cystitis, they caution against its use where there is any renal disease, as it is apt to cause an increase of albumen in the urine. They suggest the following formula for employment:—

R Extracti pichi fluid., . . . . .	32.0
Potassii nitratis, . . . . .	4.0
Syrupi, . . . . .	90.0

M. Sig. : A teaspoonful every three hours.

Laval suggests that the extract be made from young twigs of the plant, rather than from the wood, which is inactive. Rothrock<sup>176</sup><sub>June</sub> also speaks in high terms of this remedy, using the fluid extract, in doses of 20, 40, or even 60 drops, in sweetened water, every three hours. He recommends also the employment of *rhus aromatica* and *hydrastis Canadensis*. Peroxide of hydrogen meets the author's approval as an antiseptic and bactericide, often being followed by most favorable results. He suggests the following as an excellent formula:—

R <i>Rhus aromatica</i> , . . . . .	℥ij ( 7.78 grammes).
<i>Nux vomica</i> , . . . . .	gtt. xvj.
Acid phosphate of calcium, . . . . .	℥j (31.00 grammes).
Orange-syrup, . . . . .	℥j (31.00 grammes).

M. Sig. : One fluidrachm (3.75 grammes) every three hours.

Iodoform injections into the bladder are warmly lauded by Garey,<sup>801</sup><sub>May</sub> and are also favorably mentioned by Dame and Powell,<sup>39</sup><sub>Mar.</sub> in cases of purulent cystitis. Caubet,<sup>236 9</sup><sub>Jan., Feb.; Mar. 21</sub> in an extensive review

of the treatment of cystitis in women, considers the subject under the headings, urinary antiseptis, medical treatment, medical and surgical treatment, and surgical procedures. Among the remedies suggested for the first of these indications, the author mentions salol as one of the most efficient means; borate of sodium as efficient, but apt to create gastric disturbance; benzoic acid, and benzoate of sodium,—these last as proven inefficient. He personally favors the use of the first named (salol), in  $\frac{1}{2}$ -drachm (1.94 grammes) doses, daily, for several days, before any operative procedure; intra-vesical douches of boric-acid water (3 to 100), and the disinfection of any instruments used. The medical treatment includes, primarily, injections of morphia; barley-water, linseed tea, and other diluent diuretics aid in calming the pains in micturition by freeing the urine from its irritating properties. Mineral waters are of little value, according to this authority. Rest and opium, chloral, bromide of potassium, and belladonna are requisite for the relief of the pain, and purgatives and enemata are valuable for the treatment of the constipation. The medico-surgical indications are, for the most part, devoted to the injection of various remedies, for their local action,—calmative, astringent, or antiseptic,—into the viscus. Among the first, cocaine takes the principal position; morphia and the other opiates are also used, but to a less degree. Among those agencies which are supposed to exercise a direct influence upon the inflamed membrane, boric acid, permanganate of potash, Labarraque's solution, sulphate of quinine, and nitrate of silver are all mentioned; as, too, the balsams, iodoform, and other remedies. In operative procedures the two prime measures—dilatation of the neck of the bladder and the establishment of a vesico-vaginal fistula—are both described. Humphreys<sup>53</sup><sub>Jan. 24</sub> reports a case of post-gonorrhœal cystitis which yielded to nothing but supra-pubic drainage of the viscus. Amelioration was then not entire.

Benkendorf<sup>129 229</sup><sub>Feb. ; May</sub> reports a case of cystitis treated with entire success by the dosimetric method of therapeutics. The case was that of a woman, in unhygienic surroundings, nursing a baby 1 year old, and caring for two other children and for her house. The child was weaned; the mother put on restorative and calmative measures, and gradually became less anæmic and gained some flesh, but the bladder remained painful. Finally, under the use

of helenine and arbutine (5 granules each) with aconitine (2 granules), the patient rapidly improved, and went on to recovery.

In the treatment of vesical spasm, with consequent retention of urine, Mesnard<sup>229</sup><sub>Mar.</sub> obtained almost immediate success, after failure at catheterization and a sitz-bath, from 1 granule each of bromhydrate of cicutine and hyoscyamine, every quarter of an hour. After an hour's use of these remedies, the patient, an old man aged 67 years, was passing his urine freely. Next day he complained of incontinence, and the hyoscyamine was replaced by sulphate of strychnine, 1 granule every hour. He was eventually restored to health. Irwin<sup>51</sup><sub>July</sub> reports a case of spasm with retention, in a lad of 10 years of age, effectually overcome by urethral injection of cocaine in 4-per-cent. solution. The boy had been under treatment for some days previously for obstruction of the bowels from impaction.

Rochet<sup>3</sup><sub>May 8</sub> reports the case of a young man with a primary attack of gonorrhœa. Four days after the onset there occurred complete retention. Catheterization was easily practiced by the physician but the retention continued unchanged after the withdrawal of the urine. The patient felt no pain and no desire to urinate, and there was not the least obstruction to the passage of the catheter. Rochet administered ergot and electrical stimulation in the hypogastric region, with the result of quickly overcoming the symptom. The cause of the retention in this case was clearly a paralysis of the walls of the bladder from the intensity of the primary affection. Reynolds<sup>801</sup><sub>Sept.</sub> narrates 2 cases of retention,—one by an enlarged prostate, in which operative procedure was refused after failure to pass a catheter, and which was terminated by death, and another from an impermeable stricture several inches anterior to the bladder, in which case external urethrotomy was performed with an admirable result.

A case of vesical calculus is reported by Cameron,<sup>213</sup><sub>Apr.</sub> occurring in a man of 24 years of age, and giving rise to pain in the perineum and at the end of the penis, chiefly at the conclusion of micturition, with more or less hæmaturia. This condition followed an attack of renal colic of the right side,—an attack which was never repeated. Sounding failed to reveal the presence of any calculus, but with the cystoscope a small, polypoid body could be made out

close to the orifice of the right ureter. A supra-pubic operation was done, and the body was found to be a small uric-acid and urate calculus, about the size of a kidney-bean, almost entirely encysted in mucous membrane slightly altered, and attached to the wall by a distinct pedicle. It is supposed that the stone was impacted in the lower end of the ureter, and came into the bladder either by causing a prolapse of the mucous membrane of the ureter or by causing the whole thickness of the wall before it. It was not entirely encysted, a small part remaining uncovered at the apex.

## ENURESIS.

Koerner<sup>319</sup><sub>No. 23</sub> <sup>157</sup><sub>Sept.</sub> calls attention to the probable relation between mouth-breathing and nocturnal incontinence, the former being due to disease or growths in the naso-pharynx. The nature of this relation is not clear; but the author cites several cases where the removal of the naso-pharyngeal disease effectually arrested the nocturnal enuresis.

In the treatment of this condition in children, as usual, a large number of remedies are mentioned by various writers. Kerley<sup>51</sup><sub>Apr.</sub> reports the results obtained in the New York Infant Asylum, in the cases of twelve bed-wetters (nine boys and three girls), from the use of atropine. The children ranged from 4 to 10 years of age. All were in fair health, and no cause for the affection was apparent; all had always been troubled with enuresis nocturna, and several wet themselves in day-time, in addition.

Atropine was administered, as described by Watson,<sup>51</sup><sub>Oct., '89</sub> to the manifestation of its physiological action in 3 cases, but in the mildest forms. After six weeks' treatment, slight improvement was noted in 4; at the end of the third month these 4 wet the bed but once or twice a week. At the end of the fifth month 7 were practically well. Treatment was, however, continued for two months longer, and then dropped gradually. At date of report, nine months after treatment, there were no relapses. At the end of the fifth month the other 5, including the girls, were not much changed, but during the next three months the improvement was constant, though gradual. During the tenth month there was only an occasional wetting, and the dose was dropped to one-half. At the end of a year's treatment there was no longer any bed-wetting, and in six months after treatment there has been no relapse.

Krauss<sup>170</sup><sub>Oct.</sub> arranges cases of enuresis, in adult as well as in the age of childhood, into four groups: (*a*) those caused by functional disturbances of the genito-urinary tract, and cause the incontinence by maintaining irritation, as tight prepuce, sensitive clitoris narrow meatus, sensitive urethra, weak sphincter, cystitis, pressure on the bladder in pregnancy, ascarides in the rectum, etc.; (*b*) those due to disorders of the central nervous system, as precocious or pernicious mental development and dreams; (*c*) those due to failure of the spinal reflex, as in locomotor ataxia, transverse myelitis, or tumors of the spinal cord; and (*d*) those due to organic changes in the genito-urinary tract. In the first group he advises the removal of the cause of irritation and the administration of *rhus aromatica*, beginning with 5 and increasing to 25 drops four times daily. In the second group he again advises the use of *rhus aromatica*, combined with a nervous tonic or sedative, as may be indicated. In anæmic cases he suggests the following formula:—

- R Fluid extract of *rhus aromatica*, . . . . f3v (20 grammes).  
 Syrup of iodine of iron and elixir of calisaya,  
 each equally to make up . . . . f3ij (60 grammes).  
 M. Sig.: Half a teaspoonful four times daily.

In the third group, especially met among adults, the drug in question has no value, so far as the author's experience extends. In the last group, where there is more or less hypertrophic paralysis of the vesical apparatus, he suggests that the drug be used in half-drachm doses, but has had no personal experience. He follows these with a brief *résumé* of cases illustrating the views he indicates.

Gundez<sup>6</sup><sub>Aug.8</sub> recommends the use of antipyrin in the urinary incontinence of children. Out of 37 cases, 19 were completely cured, 15 much relieved, and in but 3 was there total failure with this drug. He administers it in from 7 to 15 grains (0.5 to 1 gramme) or more. He advises that it be given in the evening after 8 P.M., or so that the last dose be administered after this time. The drug is usually well borne by children.

Greene<sup>2</sup><sub>Nov.29,'90</sub> recommends, where the incontinence is dependent upon an irritable condition of the neck of the bladder with atonicity, as is not infrequently the case among adults, that lycopodium (*L. clavatum*) be administered in the form of the tincture, 20

to 40 minims (1.3 to 2.6 grammes) three or four times daily. In the manufacture of the tincture the crude drug is best subjected to a prolonged trituration with sugar of milk, after which it is readily soluble in spirit. Greene believes its good effects are due to its producing an anæsthesia of the mucous membrane of the neck of the bladder, at the same time exerting a tonic influence on the sphincter.

In dosimetric practice strychnine and hyoscyamine are relied upon quite extensively. Barnes<sup>229</sup><sub>July</sub> and Chazarain<sup>229</sup><sub>Mar.</sub> mention illustrative cases of the favorable action of these remedies. In a general article, in review of the therapy of enuresis, Louvain,<sup>378</sup><sub>Sept.10</sub> enumerates, as the principal remedies employed in this condition, atropine (quoting Eibe as having obtained cures in 87 per cent. of female and 55 per cent. of male children affected), bromide of potassium (3 cures out of 13 cases), cold douches (4 ameliorations from 10 cases), bicarbonate of soda (valuable in overcoming hyperacidity—in this connection 4 cures in 7 cases), ergotine (of use in weakness of sphincter), strychnine and iodide of iron (useful as nervous stimulants), rhus aromatica (of little value), Tienhoven's method<sup>64</sup><sub>Sept.</sub> of raising the pelvis so as to keep the urine away from the neck of the bladder as much as possible during sleep, Harkin's practice of blistering the nuchal region (sometimes productive of rapid cure after the failure of other measures), electricity, and hypnotism with suggestion.

Ollivier<sup>26</sup><sub>June</sub> advises the employment of electricity to the urethral sphincter in incontinence in children. A sound is introduced having a metallic bulb, the urethral part being protected by a coat of India rubber. As soon as the bladder is reached the sound is withdrawn slightly so that the bulb rests in the sphincter. This sound constitutes one pole of the battery, the other pole being applied to the pubis or perineum. A feeble current should be used, the intensity being gradually increased. Steavenson,<sup>6</sup><sub>Jan.10</sub> also recommends the use of electricity in these cases, especially where the incontinence is undoubtedly due to loss of tone of the sphincter, as in women who have received some injury after parturition, and who are likely to pass urine on the slightest cause,—when laughing, going up stairs, or riding on horseback. He advises a pad connected with the negative pole of a continuous-current battery over the lower dorsal region, and a small button electrode

(the positive) over the perineum. A weak current is always advisable, the application being usually made for about eight or ten minutes every day or every other day for eight or ten times.

Murphy<sup>186</sup><sub>Apr.</sub> recommends faradism, the current being gradually increased, a rectal electrode in the rectum and a sponge electrode over the mons veneris in females, over the perineum in males. Sanger, of Leipzig,<sup>6</sup><sub>June 13</sub> recommends a systematic course of urethral dilatation in cases of enuresis, both in adult and young females. He introduces a metal catheter into the bladder, keeping the thumb over the aperture, and then firmly presses the instrument from side to side and backward away from the pubes, for eight or a dozen times. During the course of treatment the patient is desired as much as possible to control the sphincter by means of the will, to drink as little as possible, and to keep the abdomen warm. He ascribes the good effect of this mechanical treatment to the contractions of the sphincter after dilatation and stimulation. When the sphincter is, however, so atonic as to be wide and of large calibre, the treatment avails little, a plastic operation being rather required.

Bogot,<sup>2</sup><sub>Mar. 7</sub><sup>16</sup><sub>Apr., Oct.</sub> in a paper upon massage as applied to the treatment of urinary incontinence in women, mentions this method of Sanger, as well as that of Sims and Nissen, by distension of the bladder with warm water, and that of Brandt. Details of several cases cured by a modified Brandt method are given. The most essential part of this treatment is the direct treatment of the neck of the bladder by the finger in the rectum or the vagina. The following are the complete steps in this method of Brandt: 1. Tapotement of the lumbar and sacral regions. The patient stands with the feet together, bending slightly forward and supporting herself against a wall or some other firm object with her outstretched hands. A rapid, springy percussion is then made with the closed fist down both sides of the spine, beginning at the lumbar region and passing downward over the buttocks, after which the open hand is stroked firmly downward in the same direction several times. 2. The patient in dorsal position on a low couch as for vaginal examination; the operator in front of the patient, right foot on the ground, left knee on the couch; then bends over the patient, extends his arms and lays his hands, ulnar surfaces approximated and finger-tips toward the pubes, on the woman's abdomen, in

the hypogastrium. Sinking the fingers deeply into the abdomen as if to grasp the bladder, a hand on either side of it, a side-to-side motion is made with each hand several times. 3. The index finger of the left hand is introduced into the vagina in such a manner as to partly encircle the neck of the bladder, and the right hand grasps the left wrist so as to regulate more evenly the pressure. This done, the finger in the vagina is made to vibrate against the neck of the bladder, compressing it against the pubes with moderate force; the same is then done for the other side of the neck of the bladder. In children the finger is to be introduced into the rectum rather than into the vagina. 4. Exercise of the adductors of the thighs. The patient in same position places her knees and heels together and raises her pelvis off the table, supporting herself on heels and shoulders. The operator now draws the knees apart, the patient resisting, three or four times; then, the patient pressing against his hands, the operator forces the knees together several times.

A paper, describing and detailing the favorable results of this method in several cases, is contributed also by Csillag.<sup>158</sup>  
Duret<sup>220</sup><sub>Jan. 28</sub> mentions 2 cases of incontinence in women, the condition resulting from overdistension of the urethra,—in one case for the treatment of a vesico-vaginal fistula, in the other in the removal of a vesical calculus. In both cases he employed a modification of Pawlik's operation with satisfactory results. The urethral canal was circumscribed by a circular incision, and a second incision of the same kind made about one or one and one-half centimetres in front of the first. The mucous zone between these incisions was then resected, the canal being consequently free between the cuts. The urethra is then dissected up for about two centimetres, and its mucous surface attached by catgut to the pubis, the opening being in the form of a transverse slit, almost in contact with the clitoris.

As the result of this operation, an elongated posterior wall of the urethra is obtained, and the canal describes a transverse curve, the concavity being above. It is quite probable, too, that the urethral sphincter is replaced by a cicatricial band, which serves the additional purpose of supporting this curve in the circumference of the urethra, and also prevents the ready escape of the urine.

## DISEASES OF THE SUPRA-RENAL BODIES.

After a long and careful series of experiments upon lower animals, Alezais and Arnaud come to the following provisional conclusions: The supra-renal capsule, an organ which continues its functions in adult life, is not indispensable to life. Its functions are unknown; they may, in the lower animals, be disturbed or even suppressed, at least for a short time, without the organism showing any other notable modifications except an increase in the pigmentation of the skin and mucous membranes, which is still, however, under control. Side by side with such mild cases lesions of the adrenal bodies frequently cause a fatal termination in the animals experimented upon, by some explosion of nervous accidents, early or late, accompanied, when survival permits, by an ascending alteration of the sympathetic nervous system acting through the lateral columns of the cord. These results, in the main, are confirmatory of those announced by Stilling,<sup>92</sup><sub>Ost.</sub> who determined the adult value of the supra-renal capsules by establishing a compensatory hypertrophy in one adrenal upon removal of its fellow. In his investigations the latter (Stilling) has come to the conclusion that the prominence accorded by Addison to the adrenals, in the production of the disease bearing his name, is essentially correct. He is averse to attribute the most of the pathogenesis of the affection to alteration of the nerves of the sympathetic ganglia. He has found, in his experiments, small bodies of the same structure as the supra-renal capsules in these nervous ganglia, and thinks that in Addison's disease either these fail to develop, as in the experimental cases, or are incompetent to carry on the entire function of these bodies. Such aberrant supra-renal capsules are not at all infrequent, records of their existence being made by May, Jaboulay, and others. Pilliet<sup>73</sup><sub>No.1</sub> recently has shown their existence in the Wolffian bodies, and the same author<sup>7</sup><sub>No.10</sub> also reports the discovery of a pigmented body, of the size of the head of a large black pin, and presenting the complete histology of a supra-renal capsule in contact with the semi-lunar ganglion. The capsule of the same side was in no appreciable way abnormal, and there were no symptoms referable to these bodies. As a rule, it may be added, particularly in reference to the small bodies described by Stilling, only the medullary portion of the adrenal is exhibited, but in this of Pilliet the minute

anatomy was complete. Alezais and Arnaud are not willing to accede entirely to the views of Stilling on the relative importance of the supra-renal bodies *per se* and the nervous system, the changes in the latter being regarded by Stilling as in reality secondary in occurrence by simple extension of the inflammatory process, the peculiar changes underlying Addison's disease being regarded by him as existing in the adrenal bodies. Thus, he does not believe that the destruction of one single capsule is ever productive of the disease in question, the other body and the small accessory bodies mentioned being able, in their hypertrophied condition, to perform the entire function. This Alezais and Arnaud deny, referring, for a discussion, to their paper upon tuberculosis of the supra-renal capsules in relation to Addison's disease.

92      2      90      46  
Apr. ; May 9 ; June ; Jan. 30, Feb. 28, Mar. 30, Apr. 30

In this article the authors name tuberculosis as the most frequent and important change in the adrenals in Addison's disease. The various other changes in these bodies, as chronic inflammation, caseation, or calcareous infiltration, are to be regarded only as the different results of the tuberculosis; atrophic changes are rare. The process is essentially one of tubercular infiltration, and the presence of tubercle bacilli has been repeatedly demonstrated. This diffuse infiltration, separating the cells of the organ into little islets, is marked in the cheesy change by a marbled appearance on section, the islets of darker adrenal cells showing in contrast with the white, cheesy substance. The process may begin in cortex or medulla, less often in the fibro-vascular zone about the capsule. Changes may be found in the neighboring tissues as the result of such processes in the supra-renal capsules, as alterations in the abdominal sympathetic nerve, changes in the mesenteric glands, tubercular disease of the spine (23 recorded cases of Pott's disease) and lungs, alterations in the kidneys and uro-genital organs. Of these, pulmonary tuberculosis is the most frequent accompanying lesion, perhaps, although the relative proportion of pulmonary and supra-renal tuberculosis is not worked out. The authors found, in 20 cases of pulmonary tuberculosis, 5 cases of tuberculosis in the supra-renal capsules (3 of these Addison's disease), 3 instances of marked venous stasis, 2 of intense hyperæmia, 3 of sclerosis with or without fatty degeneration, 1 of hæmorrhage, and 6 of a practically normal state. Among 7 instances of tuber-

culosis of the supra-renal bodies the authors found Addison's disease in 4. Briefly, these 7 cases may be enumerated as follows, and it is to be noted that among them occurs the instance just referred to, of the occurrence of Addison's disease with disease of but one adrenal body : (1) Addison's disease, classical tuberculosis of adrenals, changes in pericapsular nerve-ganglia, normal condition of semi-lunar ganglia and solar plexus ; (2) Addison's disease, tuberculosis of both adrenals, no pulmonary tuberculosis, tuberculosis of the finger ; (3) Addison's disease, pulmonary tuberculosis, tuberculosis only of the right supra-renal body, generalization to the posterior pericapsular tissue, destruction of the pericapsular nerve-ganglia ; (4) tuberculosis of both adrenals without Addison's disease, pulmonary tuberculosis, normal condition of the pericapsular ganglia ; (5) cheesy tuberculosis of right adrenal, beginning tubercular infiltration of the macroscopically healthy left body, pulmonary tuberculosis, no pigmentations ; (6) tuberculosis of lungs and right adrenal ; (7) Addison's disease, tuberculosis of the supra-renal capsules only, changes in the immediate vicinity of the capsules and in the pericapsular nerve-ganglia. It has been supposed by many that Addison's disease arises as an expression of insufficiency in function in the diseased supra-renal bodies ; yet these bodies have been repeatedly destroyed in man without the appearance of Addison's disease, and there are on record cases where the disease appeared with but a single capsule involved. The authors regard as more nearly the truth the view that ascribes the phenomena of the disease, especially the prominent nervous symptoms, as the sudden and complete asthenia, the vomiting, the lumbo-abdominal pains, and often the sudden death, to alterations in the abdominal sympathetics. Nevertheless, the pathological facts thus far established are, in the view of the writers, insufficient to base any theory upon, as in a number of instances the abdominal sympathetic has been found quite normal. In 49 cases met with, the abdominal sympathetics were quite normal in 12 instances ; among the rest, a portion were not well examined on this point ; and in others only a slight pigmentation of the nerve-cells, or else a fibrous change which occurs apart from Addison's disease in various affections, was found. The authors, however, believe that these nervous symptoms arise directly within the capsules themselves. These investigators<sup>3</sup><sub>Oct. 7</sub> do not believe that the medulla of the supra-renal

capsule contains nerve-cells, but have found undoubted nerve-ganglia in the periphery of the organ, mostly on the posterior surface, as a constant element. These pericapsular nerve-ganglia are numerous, of a rounded or oval shape on section, contain a number of large cells from thirty to forty micromillimetres in diameter, a connective-tissue stroma, and some few bundles of fibres of Remak. They are provided with arterioles and possess a special capsule. Alezais and Arnaud believe that these bodies are always implicated in the capsular lesion of Addison's disease, although heretofore such changes have been overlooked; in fact, they look upon changes in these ganglia as the starting-point in the disease, and that the symptoms of Addison's disease depend upon the degeneration of the envelope of the adrenals and the nerve-organs in relation. They call especial attention to 3 of the foregoing 7 cases. In one there was marked tubercular change all about these ganglia, which were, however, intact, and no symptoms of Addison's disease were present; in a second, the pericapsular ganglia, as well as the left semi-lunar ganglion and branches of the solar plexus, were involved, the symptoms of Addison's disease being present; in a third the pericapsular ganglia alone were involved, the rest of the abdominal sympathetic system being intact, Addison's disease being manifest. From these results the authors conclude that not the great sympathetic nerves and ganglia, not the supra-renal capsules themselves, but the pericapsular nerve-ganglia constitute the especial starting-point for the development of the symptoms of Addison's disease. These views of Alezais and Arnaud, as to the importance of the pericapsular ganglia in developing the symptomatology of Addison's disease, are, at least in part, confirmed by Accorimboni,<sup>589</sup> who reports a case of typical Addison's disease in a woman of 67 years of age. Both capsules were very much increased, caseated, and adherent; no apparent lesions in the neighboring large ganglia, and no tuberculosis of other organs.

As a side issue of their investigations, Alezais and Arnaud<sup>46</sup> have occupied themselves also with an examination of the blood from the supra-renal capsules. They show that in its essential nature it is arterial, oxidized blood, and state that the short, thick vein, which usually pours at once into one of the lumbar veins has an excessive amount of muscular tissue in it. In its flow, however, and its communication it is venous. That this nature

of the blood from these bodies bears in some way upon their unknown function is undoubted, although it does not especially indicate the character of that function. Among those writers who have upheld the importance of the sympathetic abdominal ganglia and nerves in the etiology of Addison's disease, Fleiner, of Heidelberg, <sup>4 69 34 1</sup><sub>No. 22; June 25; Apr. 28; Oct. 31</sub> has recently published the microscopical changes found in 2 cases of Addison's disease. In one there was tuberculosis of both adrenals, in the other one an angio-sarcoma of the left one. In the semi-lunar ganglion and from this point upward through the whole sympathetic to the spinal ganglia, in both these cases, there was to be recognized a pronounced inflammation which apparently followed the vessels, and was followed by degeneration of the nerve-fibres and cells. In both instances, too, the ischiatic, crural, median, and vagus nerves were examined and found to present a high grade of inflammation. The appearance of the spinal ganglia showed that here, too, it was the sensory filaments which were degenerated. Von Kahl den <sup>34</sup><sub>June 23</sub> has recently met 2 typical cases of Addison's disease. In both instances caseation of both supra-renal capsules occurred, but in the semi-lunar ganglia and the sympathetics there were practically microscopical changes apparent. No changes were evident in any of the higher sympathetic ganglia. Further, the author has met 6 cases of adrenal caseation, in some of which there was distinct round-celled infiltration of the semi-lunar ganglia without bronzing of the skin. The author concludes from these cases that Addison's disease cannot be said to be directly due to changes in the sympathetic abdominal ganglia; although, perhaps, this or that symptom of the affection may depend on such involvement of the sympathetic ganglia. With reference to the inflammatory and hæmorrhagic changes described by Tizzoni as appearing in the spinal cord in cases of experimental Addison's disease, the author examined the cord in all 8 cases mentioned. The results were, in general, negative in character; while there were some inflammatory and degenerative changes met in these cases, they were very irregular and variable in their degree and in their localization, quite similar to changes met in other general anæmic and malnourished cases, as described by Lichtheim and others in the spinal cords of patients dead from progressive pernicious anæmia. Mann <sup>2</sup><sub>Mar. 21, 28, Apr. 4</sub> mentions several cases of undoubted Addison's dis-

case in which the supra-renal bodies were typically caseated. The semi-lunar ganglia were, however, quite normal, microscopically as well as macroscopically. The author is, however, disposed to regard the affection as the result of nervous disturbance induced in some manner secondarily to disease of the supra-renal capsules. The author believes the pigment material to be a derivative from the blood, although it does not exhibit a proportion of iron sufficient to prove its origin from the hæmoglobin. How the pigment exists when received from the blood-vessels is not understood, nor the exact manner of the deposit.

Roloff <sup>768 245</sup><sub>B.9,H.2,90; Aug.</sub> records a case of Addison's disease, in a phthisical student, aged 22 years, dead in collapse. The autopsy showed pulmonary tuberculosis and an almost complete atrophy of the supra-renal capsules. There was no evidence of tuberculosis in these. Semi-lunar ganglion perfectly healthy. The author refers to 12 cases of atrophy of the supra-renal bodies with pigmentation and to 1 unpublished case of tubercular change of both bodies without pigmentation of the skin. Leva <sup>20</sup><sub>B.125,H.1</sub> describes in detail 6 cases of Addison's disease, in 4 males and 2 females, the most between 42 and 50 years of age, the rest younger. The duration of these cases varied between two months and six or eight years. There were no especial clinical peculiarities. Two were subjects of general miliary tuberculosis. He mentions 2 other cases where the autopsy showed the supra-renal capsules the seat of neoplastic formations, but in which no trace of Addison's disease was evident during life. Typical cases of the affection are described by Tyson, <sup>112</sup><sub>Sept.</sub> the supra-renals both enlarged and cheesy, the abdominal sympathetics enlarged and red to the naked eye; by Bergtold, <sup>1</sup><sub>June 13</sub> both capsules enlarged and cheesy; by Drysdale, <sup>6</sup><sub>Oct. 3</sub> both adrenals enlarged and cheesy, the semi-lunar ganglia and solar plexus somewhat atrophic, and old tubercular lesions of the bladder and kidneys; and Hawthorne and Buchanan, <sup>213</sup><sub>Apr.</sub> Tyson's case occurred in a man 35 years of age, and was associated with pulmonary tuberculosis and Pott's disease of the spine. Bergtold's case occurred in a male, aged 35 years, who ascribed his illness to having fallen into ice-cold water about fifteen months before his death, his health never having been good since that occurrence. The lungs showed no tubercular change, nor could any evidence of tuberculosis be found anywhere; sections of the enlarged, caseated adrenals failing

to show either giant-cells or tubercle bacilli. Drysdale's report concerned a male, 39 years of age, with the history of previous tubercular disease of the bladder and kidneys. The last case, described by Hawthorne and Buchanan, occurred in a young girl. Pilliet<sup>7</sup><sub>No.18</sub> describes a case of tuberculosis of one supra-renal body without pigmentation of the skin. It occurred in a woman, 58 years of age, affected with tubercular joint disease of one hip and pulmonary phthisis. Stylyr<sup>832</sup><sub>v.4, No.1</sub> reports 2 cases of primary cancer of the supra-renal capsules, without pigmentation. In the first, both organs were cancerous, but there were no secondary nodules in any of the other organs; in the second, the mediastinal and retro-peritoneal glands were invaded, and secondary nodes were also found in the left kidney and the liver. Histological examination showed that the new growth had taken its origin from the zona fascicularis of the capsules. Napier<sup>213</sup><sub>May</sub> records a case of Addison's disease in a butcher, aged 46 years, dead after two years' illness, showing the usual course of symptoms. Tuberculin had been used in the treatment of the case, half a dozen doses having been given; but, as there was no reaction, it was abandoned. At the autopsy nothing tubercular was found, but the right adrenal was found much enlarged and apparently transformed into a hæmorrhagic cyst, its contents having the appearance of a laminated clot. A case of reaction to Koch's lymph, in a patient with no other evident tubercular lesion than Addison's disease, the most marked symptom of which was the pigmentation, is reported by Pick.<sup>88</sup><sub>Nos. 51, 52, '90</sub> No reaction followed the first dose, but the second injection produced a violent reaction. Two cases of improvement under the use of Koch's lymph are reported by Lenhartz<sup>116</sup><sub>Jan.</sub> and by Graziadei.<sup>997</sup><sub>Feb. 25</sub>

#### URINALYSIS.

*Normal Urine.*—At what limit does an exaggerated or insufficient excretion of the urine principles begin? This question Beugnies-Corbeau<sup>24</sup><sub>May 5, 12, 19</sub> endeavors to answer from a large series of observations, in which the body-weight is definitely considered; but, of course, not noting those variations which cannot be entirely eliminated,—of temperature, of food and drink, etc. He makes the average total amount for twenty-four hours 20 cubic centimetres for each kilogramme of weight, about 20 centigrammes of

chlorides for each kilogramme of weight, 4 centigrammes of  $P_2O_5$ , 46 centigrammes of urea, and a density of 1020.5 (corresponding to total excretion of 1500 cubic centimetres). He has found faint traces of sugar, but never any albumen, in the urine of healthy persons chosen for his investigations.

#### ALTERATIONS IN QUANTITY.

*Polyuria.*—*Polyuria simplex*, or *diabetes insipidus*, whether of transient, periodical, or constant occurrence, has never, in modern medicine, been ascribed the dignified position in disease that polyuria with glycosuria has been granted. While there is now a growing tendency to ascribe to the latter a distinctly symptomatic rôle, the former has always been looked upon as manifesting some underlying affection, mild or grave, general or localized. Nevertheless, between the graver cases of diabetes insipidus and cases of diabetes mellitus, there probably exists more similarity than merely in name. Especially can such similarity be recognized in the frequent existence of some nervous factor in the etiology of both these affections; and, further, many of the clinical symptoms of these graver forms of polyuria approach those of diabetes mellitus. A case well illustrating this is recorded by Voss.<sup>4 55 9</sup>  
\*Jan. 5; Aug. 1; Feb. 21  
 In this case, a girl 17 years old, adipositas universalis existed as a complication of the condition. The patient belonged to a healthy family in which there was no diabetes, excessive corpulence, or any nervous disease. She presented the symptoms of her affection as early as when six years old, when she lost her appetite and manifested great thirst and polyuria. Later, her appetite returned, and at this period the beginning of the fat deposit was noted to so great an extent as to soon cause decided impairment in the movements of the girl. Her muscular strength and her memory began to diminish, the skin became dry and harsh, and constipation became obstinate. When met by Voss, the girl was short, with limbs poorly developed, but with large body-girth. There were no nervous symptoms. She passed from 5 to 7 litres (5 to 7 quarts) of urine in twenty-four hours, free from sugar and albumen. The genital organs were poorly developed, as were the breasts, and there was primary amenorrhœa. Medication by opium lowered the amount of urine, but the patient continued to grow weaker and more and more somnolent. The thirst, too, continued. Anti-

pyrin had no influence upon the excretion. The author explains the development of the adipose condition in the following manner: While the desire for food in the first four years of the disease was slight, with the development of puberty, in the fourteenth year, nature made an effort to stimulate the development of the organism, as shown by the increased desire for food; puberty, however, remaining undeveloped, the surplus food formed useless fat. At the same time, the natural physiological stimulus for proper blood-formation—menstruation—being wanting, the girl became chlorotic, and thus the more predisposed to fatty deposit. Its occasional hereditary origin is well illustrated by one of several cases in young children, mentioned by Rachel<sup>19</sup><sub>Oct. 24</sub>; in two others of these cases the association with furunculosis constitutes another similarity to the semeiology of glycosuric polyuria.

Mathieu<sup>3</sup><sub>July 29</sub> reports a case of simple polyuria, without azoturia or phosphaturia, in a hysterical male in whom both conditions were apparently the result of absinthe-drinking. Or it may be that the polyuria was a manifestation of the hysteria; but, as it is well known that habitual absinthe-drinkers are apt to reach convulsive crises, it seems more probable that some such nervous shock may have been at the bottom of both. Potain<sup>3</sup><sub>Jan. 28</sub> <sup>17</sup><sub>Feb. 7</sub> presented before his class a man who was passing 5 or 6 litres (5 or 6 quarts) of urine in twenty-four hours. The excretion had a low specific gravity, contained neither albumen nor sugar, possessed the usual proportion of urea, and was of a pale, slightly greenish tinge. He was one of a large family, good antecedents; there was, however, a slight tendency to hæmorrhage among his family, and in his children an evident nervous taint. He was of a neurotic character himself, had had a severe head injury some time previously, and was exposed to sudden and cold baths, as a marine. He had received several nervous shocks. After an effort to save a life by a plunge into cold water, he had noted first the presence of symptoms of disease. In the treatment of this case, Potain suggested the use of belladonna and opium, or of valerian, as a nervous sedative to prevent the nervous impression of thirst and the consequent excessive micturition. Iron, quinquina, electricity, turpentine, ergot, jaborandi, hydrotherapy, and, finally, antipyrin were named as effectual in special cases of the condition. Sourouktchi<sup>586</sup><sub>No. 1</sub> <sup>64</sup><sub>July</sub> states that there are on record but 2 cases of diabetes insipidus of syphilitic

origin discovered before death,—the cases of Demme and Hösslin. In other cases the syphilitic nature could not be entirely proven. The writer adds a third to these 2 cases: a man 25 years of age had had polyuria for a long time, passing as much as 6 litres (6 quarts) of urine a day. The excretion was of low specific gravity (1004), contained neither albumen nor sugar, and showed a normal amount of urea for the twenty-four hours (29.5 grammes—7 drachms  $35\frac{3}{4}$  grains). The patient complained of polyuria as the first symptom of intense thirst, bulimia, pains in the head (worse at night), and loss of flesh and strength. On the gland of the penis there was a small scar, the only trace of a hard chancre removed by excision. Seven months before—five weeks after the last coitus—a small wart-like tumor appeared and was excised. There were no signs of secondary phenomena, but, during his stay in the hospital, bone pains, vertigo, and, finally, mucous patches appeared and rendered the diagnosis certain, and the disappearance of the polyuria and its allied symptoms under specific medication confirmed the view of its syphilitic origin.

Duponchel<sup>3</sup><sub>Dec. 3, '90</sub> called the attention of one of the medical associations of Paris to the enormous size of the bladder of a young soldier affected with diabetes insipidus. It contained as much as 2 litres (2 quarts), and measured 16 centimetres in height and 14 centimetres in diameter.

Maslovsky<sup>19</sup><sub>Sept. 10</sub> draws attention to antipyrin and antifebrin as remedies for diabetes insipidus, and describes a case of nervous origin, of six years' standing, in which substantial improvement had taken place under the use of these drugs. Voinovitch, of St. Petersburg,<sup>859</sup><sub>Nos. 26, 29; Sept. 5</sub><sup>2</sup> reports a case apparently completely cured by antipyrin. The patient's father and brother had died from diabetes mellitus, and he was suddenly seized with intense thirst and polyuria during a severe attack of epidemic influenza. The cure continued unbroken at time of report,—about twelve months after discontinuance of treatment.

*Anuria.* — Spallitta<sup>772</sup><sub>No. 1</sub> describes the production of anuria in dogs as a reflex phenomenon upon ligating the one ureter. Such reflex anuria is by no means unknown in connection, for example, with various operative procedures, with the blocking of one ureter by a calculus or by some testicular lesion. The manner of its production is not understood, although it is probably due to a

vaso-constriction of the kidney induced by lesion of the great splanchnic nerve.

Little<sup>6</sup><sub>July 4</sub> reports an interesting case of hysterical anuria in a girl of 18 years of age. She was frightened by a man with a traveling bear several days previously, and the physician found her bladder empty, although both she and her friends adhered to the statement that she had passed no urine since the fright. The girl was in the midst of her own family, but was watched carefully, and passed her urine apparently but once a week. The author admits the possibility of deception, but does not believe the deception could have escaped detection during the length of time the patient was under his care. About the fourth day after voiding her urine the girl would begin to vomit a mucoid matter, which the patient declared to have a fæcal taste. This would continue several times a day until the patient would urinate, when it would cease until a corresponding period in the next cycle. The girl complained of a sense of constriction about the lower third of the thighs, and below this a fine trocar pushed into the skin caused no pain except over the great, second, and third toes; and the limbs below the seat of sensation of constriction were cold. Further, the patient had occasional convulsive seizures of evident hysterical nature. Menstruation was suspended. In all, the severe attack extended over two months, and recovery was very gradual. The nature of the ischuria and its mechanism, as well as the mechanism of the other hysterical phenomena, is not understood; although it is probable that the vasomotor influences in the kidneys are in some way implicated. The vomiting the author regards as supplemental to the excretion by the kidneys.

*Pollakiuria*.—Guiard<sup>24</sup><sub>June 7, 14</sub> writes of pollakiuria of psychical cause, or at least psychical continuance. These cases are those, usually relatively young, who, having their attention constantly upon the urinary function, desire to micturate too frequently. They constitute a large proportion of that class of patients who are spoken of, in inelegant terms, as “urinary cranks.” There is rarely any actual symptom of disease of the urinary tract save the pollakiuria; and this absence of evidence of cystitis, nephritis, or of other actual urinary disorder serves at once to make up the diagnosis of the affection. There is perhaps one class of real sufferers who are to be distinguished from these psychopathic pol-

lakiurics,—those who are subjects of enlarged prostate bodies. The latter are, however, as a rule, considerably older than the class under consideration, and their pollakiuria is nocturnal, instead of constant, in the nervous cases. The urine in both these classes may be, and is to be expected to be, normal. The author narrates several such instances. In the matter of treatment the greatest element is a moral one. He would not hesitate to inject 300 or 400 cubic centimetres (10 or 13 ounces) of sterilized water into the bladder of such a patient to prove the ability to receive it and to retain a proper amount; and the proper obedience of orders to restrain the desire to micturate for such and such a length of time (constantly increasing) is an important part of his course. Local and general sedatives, general measures intended for their moral effect, and care as to the diet and condition of the digestive tract are of the utmost importance.

#### COLORING MATTERS.

*Urochrome*.—The discoverer and defender of this substance, Thudichum, recently has read another paper on the subject before the Hunterian Society of London.<sup>2</sup><sub>Mar.14</sub> He demonstrated the separation of this coloring matter by ferric chloride. When urochrome was subjected to chemolysis several products were formed,—as a black substance, uromelanin, omicholin (which produces the intolerable odor of burnt urine), and uropittin. This last is distinguished by Thudichum from hydrobilirubin, with which it is by modern chemists identified.

*Urobilin*.—This last is generally regarded as identical with the substance referred to above,—the uropittin of Thudichum. At one of the sittings of the recent Italian Congress, Mya<sup>589 15</sup><sub>No.249,'90; Feb.</sub> brought up the pathological significance of this substance, with especial view of opposing Hayem's theory of the origin of the substance. The most pronounced urobilinuria is that occurring in malaria, the phenomenon following closely upon the hæmatic destruction, and ceasing with the lowering of the vitality of the specific plasmodium in consequence of the use of quinine. The author does not think there is any reason to attribute it to hepatic disturbance, as it follows closely the various stages of destruction of the red blood-cells. The urobilinuria is less marked in other infectious diseases, which, while perhaps more fatal, are

not so destructive of the corpuscular elements of the blood. In these latter it usually stands in direct ratio with the intensity of the process. In the intoxications urobilinuria varies also in its degree with the degree of hæmolysis. Among this group of toxic urobilinurias the author places that from pyridin, phenacetin, exalgin, and acetanilid. In the anæmias the intensity of urobilinuria stands in dependence upon the breaking up of the red cells, being practically unchanged in the anæmias from hæmorrhage, but high in the essential anæmias,—as progressive pernicious anæmia,—and in the symptomatic anæmias from cancer. The urobilinuria of hepatic disease is principally met in cirrhosis, chronic venous congestion, and cancer of the liver; in some grave forms of hepatic disturbance urobilin is not at all increased, but rather scarce. From such facts it is sought to be shown that Hayem's view of the close relationship of urobilinuria and all forms of hepatic disease is wrong, and that urobilin in the urine has a wider occurrence than in affections of the liver.

Hoppe-Seyler <sup>20 32</sup><sub>B.124,p.30; Sept.</sub> states that the pigment waste of the body leaves the organism, as urobilin, in fairly uniform amounts in the fæces and urine, but that in disease the amount excreted, particularly by the urine, is apt to vary considerably. These variations depend upon two factors,—the rapidity of formation in the liver and the rapidity of absorption. He concludes, from experiments of his own upon patients in Quincke's wards, that the amount of urobilin is very great in stasis of bile in the liver, providing diuresis and consequent rapid absorption of urobilin is abundant; in polycholia, a more abundant formation of urobilin in the intestine; in stagnation of the contents of the large (not the small) intestine, an increased absorption occurring; in hæmorrhage into internal organs and in many forms of anæmias, an increased formation of bile-pigment from destroyed blood-pigment taking place, with increased formation of urobilin in the intestine and changes of the blood-pigment, extravasated in the tissues into urobilin. In pernicious anæmia and pseudo-leukæmia the quantity of urobilin is said to be normal by this authority, while it is lowered by depression of the liver-functions from cachexia, inanition, bile-stasis without access to the intestine, and scanty diuresis; and, finally, for some time after the course of an attack of jaundice. Viglezio, <sup>376</sup><sub>Nov.3,4</sub> from a series of experiments upon the clinical value

of the symptom urobilinuria, concludes briefly that urobilin can be estimated by a method sufficiently exact to satisfy clinical purposes, that it arises from the primary cause (hæmolysis), and stands in direct proportion to the gravity and extension. Hepatic alteration is not to be regarded as the direct cause of urobilinuria; it depends in some degree upon the integrity of the kidney, alterations of which, when of certain intensity, may disturb the manifestation of the symptom. The amount of urobilin in the urine may be increased by the action of any agent, infectious or toxic, which acts to the destruction of the red blood-cells. Many of the antipyretics in use at present have the power of profoundly altering the morphological composition of the blood, and their use is, therefore, accompanied by increase of urobilin in the urine. Tissier <sup>100</sup><sub>July 11</sub> reviews the history of the substance urobilin in an exceedingly biased manner, recognizing with poor grace any other contributions to the subject than those emanating from the French. He follows the teaching of Hayem, adhering to the hepatic origin of the substance, and attributes its increase in the urine to such conditions as hæmorrhages into the internal structures, to alcoholism, saturnism, carbon-dioxide poisoning, chlorosis, progressive pernicious anæmia, paroxysmal hæmoglobinuria, leukæmia, malarial fever, grippe, diphtheria and erysipelas (especially in those addicted to alcohol), acute articular rheumatism, typhoid fever (rather the result of complicating conditions, as alcoholism, pulmonary accidents, etc.), gastritis, the acute manifestations of phthisis (especially in the reactions from Koch's *tuberculin*), and pulmonary and cardiac affections influencing the state of the liver. Of the hepatic affections it may be said, in general, that it is the more constant in proportion as the hepatic cells are affected. It is most frequent in cirrhosis with involvement of the parenchymatous substance, in cirrhosis of drunkards and of tubercular cases, in fatty degeneration, in cirrhosis with cardiac disease, in cancer with cirrhosis, and in jaundice from hepatic fault. In catarrhal jaundice, the liver being itself unaffected, and in the hypertrophic biliary cirrhosis of Hanot, it is apt to be absent. The method of estimation recommended by Tissier depends upon spectroscopy. The view held by Hayem and by his pupil, the writer, regards the destruction of the red cells as the point of origin, it is true; but they demand a further condition, some direct alteration of the liver-cells, and in

so far regard the symptom as decidedly significant of hepatic disease. That there is more than mere inability to properly transform the blood-pigment into normal bile-pigment (bilirubin), in these cases of excessive hæmolysis, they prove by the fact that in these cases the bile is found to contain an increased proportion of urobilin. They look upon urobilin, then, as the characteristic product of the diseased liver-cell, just as bilirubin is the product of the normal liver-cell; the normal amount of urobilin being due to the constant change in the destruction and formation of normal cellular life.

Katz, <sup>84</sup>July 11 to Aug. 8, after a long series of experiments of clinical nature, comes to conclusions similar to those of Hayem and Hoppe-Seyler. He believes that the increased excretion of urobilin in the urine affords a diagnostic symptom of considerable value, and refers it to tissue changes which take their origin in the liver-parenchyma. The increase of urobilin excretion indicates, in such cases as may present this increase as a constant and persistent symptom, an organic alteration of the liver-parenchyma. In those cases where this increase is but a passing phenomenon, as in fever, in certain toxic conditions (as, for example, after the employment of Koch's lymph) it owes its origin to an overloading of the blood with foreign matters, or, as in jaundice, in cholelithiasis, it is due to circulatory disturbances which arise from the compression of the blood-vessels alongside of the distended biliary vessels. The increase of this substance in the urine, in cases of reaction from the tuberculin of Koch, is mentioned in papers by Cavallero, <sup>997</sup>Feb. 5, and by Agello and Solara. <sup>589</sup>No. 56

*Hæmatoporphyrin*.—Within the past two years, beginning with MacMunn, a number of authors have mentioned the discovery in the urine of hæmatoporphyrin, a derivative of hæmoglobin, but free from iron. Salkowski <sup>365 32</sup>No. 8, Sept. has recently recorded the occurrence of this substance in the urine of 3 females, attracting attention by the dark-red color of the fluid. One of these cases died. The author attributes its presence in the urine to the use of sulphonal, which was said to have been employed also in the cases of Ranking and Pardington, mentioned in last year's ANNUAL. Salkowski believes this substance identical with the coloring matter described recently by Stokvis. In this case, as well as in the 3 cases above mentioned, sulphonal had also been employed.

Copeman,<sup>2</sup><sub>Jan.24;</sub> <sup>6</sup><sub>Jan.24;</sub> <sup>32</sup><sub>Sept.</sub> at a meeting of the Pathological Society, showed two specimens of hæmatoporphyrin in the urine of 2 cases under the care of Ranking, one of which died, the other recovered. He referred also to 2 other cases (see last year's ANNUAL), in which the symptoms were similar, and the urinary pigment apparently the same. All 4 cases were highly neurotic women of middle age, free from organic disease. All complained of habitual constipation, sleeplessness, and abdominal pains, with great prostration and occasional inability to move the limbs. The amount of urine daily excreted was small; the urine, of a dark, purple-red color, free from albumen, sugar, bile, and hæmoglobin. Three of these 4 cases died in a comatose condition. In none of them could the cause be indicated by Copeman. Inquiry by Beevor<sup>2</sup><sub>Feb.14</sub> brought out the answer from Copeman, that possibly in one of these cases antifebrin may have been the cause; that one had been accustomed to taking hypnotics of various kinds in considerable quantities; another was treated with sulphonal and chloral three days before her death; and, as to the remaining one, there was no available evidence as to the character and amount of drugs taken.

From the general trend of cases as thus recorded, the suggestion of poisoning by sulphonal or other hypnotics is strong; and, if not absolutely correct, must at least stand as a warning against their too free employment.

Baginsky<sup>158</sup><sub>B.13,H.4,5,6</sub> records 2 cases of urinary pigmentation, which, differing slightly from each other, both may be provisionally classed with these cases of hæmatoporphyrin, although the behavior was not entirely like that of hæmatoporphyrin. There is no record, either, of the use of sulphonal, although one child had had antipyrin. The first was a male, 18 months of age, with double pneumonia. The urine stained the napkins a reddish-brown color. In the spectrum a broad absorption-band was seen in the green, reaching nearly to the blue, and the blue and violet were darker than normal. This separates the substance from the blood-pigment. Its watery solution evaporated the substance crystallized in reddish, rhombic plates, and sometimes formed rosette groups. It was insoluble in ether and chloroform (hence not an indican), was soluble in alcohol and in cold and warm water. It possessed no reducing properties, and did not react with ferric

chloride or indican reagents. The other case was in an 8-year-old girl, who had had scarlet fever shortly before, and had been brought to hospital in convulsions. The urine was free from albumen and had a beautiful purple color, destroyed by heating, by acidulation with nitric acid, and Jaffé's reagent. An amyl-alcohol solution gave a deep-red color and the spectrum showed a wide absorption-band between the green and blue. The use of a small amount of hydrochloric acid caused a broad, marked band back of line D, and a fainter, small band back of E. There was decided reduction with destruction of the color upon the addition of sugar or powdered zinc. The general appearance led the author to identify the pigment with the *urorosein* of Nencki and Sieber.

*Melanin*.—Senator <sup>297 32</sup><sub>No. 45; Sept.</sub> believes there are several kinds of pigment in "melanin" which have but the black color in common. He has seen a case in which the dark, reddish-brown urine, turning darker on exposure to the air, gave a reaction with chromate of potash and sulphuric acid, which must, however, be referred to indican, in which substance the urine was rich. The autopsy showed the absence of black sarcoma. Bile derivatives may simulate melanin. He believes that if the recognition of melanin in the urine be absolute it should as absolutely indicate the presence of some melanotic condition, as melanotic tumors, but the differentiation of the variety of such tumor is impossible. It is to be recalled, however, that some patients with black tumors, and passing melanin in their urine, do not show the chromate of potash and sulphuric reaction. In a case of extensive melanosis, Senator observed recently, besides the melanuria, the effusion of a dark-brown ascitic fluid, from which, after standing several days, a black deposit fell. Neither bromine or ferric chloride act on indican, but do on melanogen, and the pigment in the urine showed the characteristic difference with bromine water. The pigment in the ascitic fluid was, however, not melanogen, but melanin. Although Miura had succeeded in causing the excretion of melanogen by the urine, by the injection of hippomelanin into the abdominal cavity of rabbits, Senator undertook the same inquiry. He used melanin from human melanotic tumors, injecting it into the abdominal cavity of rabbits, and found that the urine passed afterward was rich in indican, but contained no melanogen. Saundby <sup>32</sup><sub>Mar.</sub> reports an instance of melanotic sarcoma, the primary growth arising

from the disorganized left eye, of multiple generalization throughout the abdominal and thoracic organs, the urine from which case contained melanogen, but no indican. It reduced Fehling's solution slightly and reacted to Jaksch's ferric chloride, and with the sodium, nitro-prusside, and caustic-potash tests.

*Indican*.—Hochsinger <sup>84</sup> <sup>69</sup> <sup>1</sup>  
Apr. 18; Mar. 19; July 4 has examined the urine of young infants and children with reference to the presence of indican. In the urine of healthy children and those suffering from simple dyspepsia it was very rarely found. In grave forms of diarrhœa it was almost invariably found, but when the diarrhœa was mild it appeared less often and in smaller quantities. In tuberculosis it was always present. The author believes it due to the decomposition of milk-albumen. Mazzetti <sup>84</sup>  
Aug. 1 found that the quantity of indican in the urine, in a purely albuminous diet, was enormously increased in patients with affections of the spleen and in dogs whose spleens had been removed. From these results he infers that the spleen has the function of checking the processes or eliminating the products of albuminous decomposition in the intestine.

#### ALBUMINURIA.

*Globulinuria*.—Csatáry <sup>326</sup>  
B. 57, H. 1, 2 makes the excretion of globulin a matter of prognostic value. From the study of 34 cases of renal disease containing serin and globulin, he has come to these conclusions: The albumen quotient, obtained by division of the amount of serum-albumen by that of the globulin, in nephritic urine containing both serum-albumen and globulin, bears a close relation with the rapidity of circulation of blood through the renal glomerules. It is increased in conditions in which the heart-muscle is especially strong and forceful, in which the circulation is not impeded by œdemas, in which, finally, the circulatory conditions are favorable; in opposite states it is lowered. It is at its maximum in cases of the small, contracted kidney, at its minimum in the amyloid kidney with nephritis. In general, in any form of renal inflammation, loss of power of the heart-muscle, or any increase in the obstacles to the circulation, gives rise to a decided diminution in the albumen quotient. Its increase is to be regarded in nephritis as a favorable, its decrease an unfavorable, prognostic sign. It is low in nephritic cases complicated with fever or uræmia; it is increased after disappearance of œdema, after aspiration and

removal of ascites, of pleuritic exudations, or after the administration of a cardiac tonic. Under the influence of milk diet the total amount of albumen excreted does not increase, and in some cases it diminishes; at the same time the albumen quotient becomes lowered. By albuminous diet,—eggs,—the total quantity of albumen decreased.

Poole<sup>53</sup><sub>Feb. 7</sub> publishes a paper upon the occurrence and detection of unusual forms of albumen, mentioning globulin as especially prominent and significant in acute nephritis. It is to be differentiated best from serum-albumen by some such test as Pohl's: the addition of ammonia to the urine, and after an hour filtering and then adding to a part of the clear filtrate ammonium sulphate, when the globulin is separated as a flocculent precipitate.

*Hemialbumose*.—Poole directs that the urine, for the detection of this form of albumen, be heated, the hemialbumose becoming manifest after it has become cool once more. It is coagulated by nitric acid, by acetic acid, and potassium ferrocyanide. It is met in conditions of malnutrition, as in osteomalacia, in measles, pemphigus, various forms of dermatitis, abscess of the liver, etc. It not infrequently alternates with some other form of albumen, but may occur with or precede the other albumens.

Stokvis<sup>2</sup><sub>Aug. 22</sub> recently called attention to a peculiar albuminoid in the urine. This was a hemialbumose containing urine, which formed a coagulum on heating to about 55° C. (131° F.). The urine, kept at this temperature for awhile, is filtered while warm, then heated still higher, the albumen, then coagulating, being again separated. This is continued as long as albumen coagulates with heat. A residual albumen remains, which is not to be coagulated by heat, but which coagulates only on the addition to the warm solution of sodium chloride and acetic acid, or by the addition of nitric acid to the cold solution. When heated to 55° C. (131° F.) the urine showed a large proportion of coagulated albumen, which redissolved at higher temperatures, but re-appeared when it cooled down. This body Stokvis designates as true hemialbumose, in distinction from that precipitated by nitric acid, metallic salts, etc. The urine, on addition of small amounts of acid (organic or inorganic), showed a slowly developing jelly-like substance, which redissolved on heating, but re-appeared when cool—a reaction first noted by Bruce-Jones in cases of osteoma-

lacia. The specimen shown by Stokvis was from a man 35 years of age, of powerful build, who almost suddenly experienced great pain and difficulty of movement of the upper extremities, so that a diagnosis of cervical pachymeningitis was made. There developed in a few weeks, however, small tumors on the frontal and parietal bones and on the clavicle, indicating that the previous symptoms may have been due to a tumor of the spinal column. There were no signs of osteomalacia, however.

*Peptonuria.*—Poole, above quoted, refers to peptone in the urine as a symptom not so much of renal significance as indicating the existence of increased amounts of peptone in the blood, as in various conditions associated with suppuration. It is recognized by means of a potash solution with traces of sulphate of copper, and heat, a purplish color resulting; or, other albumens having been eliminated, it may be recognized by heat, nitric acid, or a number of other agents. So, too, from a series of clinical and experimental researches, Felice has found that, by means of acetic acid and the iodomercuride of potassium, he is able to demonstrate the existence of a peptonuria in almost all cases of the grave anæmias.

#### TESTS FOR ALBUMEN.

*Salicyl-Sulphonic Acid.*—Macwilliam<sup>2</sup><sub>Apr. 18</sub> recommends, as a reagent for the detection of albumen in urine, salicyl-sulphonic acid  $[C_6H_3(OH)(HSO_3)COOH]$ , formed by the action of sulphuric anhydride on salicylic acid, or by heating salicylic acid with concentrated sulphuric acid. It is soluble in water and in alcohol. By its action albumens are precipitated from their solution and do not redissolve on heating, while albumoses and peptones do. It is exceedingly delicate, recognizing 1 part of albumen in 100,000 parts of fluid. It gives no precipitate with other substances. In practice several drops of a saturated aqueous solution should be added to about 20 minims (1.25 grammes) of urine, shaken, and examined, and then heated to the boiling-point, in order to differentiate the albumens. The same substance is recommended by Roch.<sup>814</sup><sub>Apr.</sub> under the name sulpho-salicylic acid.

*Trichloracetic Acid.*—Raabe<sup>814</sup><sub>Apr.</sub> uses this reagent in the following manner: To about 1 cubic centimetre of previously-filtered urine in a narrow test-tube a small crystal of the trichloracetic acid is added, and then set aside without shaking. The acid dissolves,

and at the juncture of the clear urine and that saturated with the acid a sharply-defined zone of turbidity develops, so sharp that it renders the test very delicate. About the only source of error is in a urine rich in urates, where the use of heat may be required to dissolve the latter. Dilution of the urine with three times its volume of distilled water prevents the simulation by dilution of the urates. Heywood <sup>814</sup><sub>Feb.</sub> <sup>2</sup><sub>Mar. 21</sub> highly recommends the test for its delicacy, and suggests that a saturated solution be carried about in the pocket. This Tirard <sup>2</sup><sub>Mar. 21</sub> discourages, because of the corrosive action of the substance, and also warns against the mistake from urates, although he acknowledges the delicacy of the test.

*Heller's Test.*—Long <sup>1</sup><sub>Apr. 18</sub> suggests, as an occasional source of error in the use of nitric acid in concentrated condition for the detection of albumen in the urine, the precipitation, at the line of juncture of the urine and acid, of crystals of nitrate of urea, and mentions an illustrative case. He states that it cannot often be that such error should occur, but refers to his case to prove the possibility. It is easily distinguished from albumen by attention to these points: (1) the nitrate-of-urea zone is formed rather in the upper stratum of the acid than between the acid and urine, as albumen is; (2) the urea-crystals, which are visible to the naked eye, project down into the acid, resembling pine-straw; (3) the zone formed by nitrate of urea is quickly dissipated by gentle heat; (4) urine giving this reaction is always of high specific gravity.

*Plósz's Test.*—Paul Plósz, <sup>844</sup><sub>Mar. 14</sub> in studying the question of the existence of albumen in normal urine, sought to find some reagent which should indicate with more delicacy the presence of albumen than those already known. The following proved to be best suited to his purpose: The urine is strongly acidulated with acetic acid, and then shaken up with ethylic ether (ordinary ether). The two fluids quickly separate, and a precipitate, formed at their line of juncture, removed by filtration, is then repeatedly washed with ether. It consists of various albuminous substances, which give all the known albumen reactions. The test occurs in all urines. The substance obtained in this manner is not a homogeneous substance, but made up of various forms of albumens. One part is soluble in acetic acid; the other insoluble. This latter is soluble in dilute alkaline solutions, and is then precipitated by acetic acid, insoluble in excess. This substance acts thus much

like mucin. From the results thus obtained, the author is disposed to accept the presence of small amounts of albumen in all urines.

*Posner's Test.*—Davis,<sup>53</sup><sup>82</sup> in an article discussing the existence of albumen in normal urine, quotes this test, which is claimed to demonstrate the presence of albumen in all urines. To the urine, after filtration, three times its volume of alcohol or a concentrated aqueous solution of tannin should be added. The precipitate is then collected, washed with water, and dissolved in acetic acid. Or a large quantity of acetic acid may be added and the urine concentrated by evaporation. In both cases, in the acetic-acid solution, all the tests for albumen which are not influenced by the acetic acid will give a positive result. Davis does not regard any of these exceedingly delicate tests as necessarily the best, the ordinary methods (by heat, nitric acid, etc.) being usually sufficient for practical purposes.

*Jolles' Test.*—Jolles,<sup>113</sup><sup>32</sup> in order to demonstrate the presence of small quantities of albumen in the urine when the latter is turbid from bacteria and not cleared up by simple filtration, recommends that the liquid be shaken with *kieselguhr* (a silicious earth used in making dynamite) and then filtered. Where there is much muco-pus, holding the albumen in the filter, it should be treated with potash solution and the filtrate acidulated with acetic acid, and then tested for albumen by means of potassium ferrocyanide. As a new test for albumen he suggests that the urine be treated with an equal volume of hydrochloric acid, and upon this be run a few drops of a solution of chloride of lime. In the presence of albumen a cloudy layer is formed. The reagent, he claims, is delicate enough to detect 0.01 per cent. of albumen. For detecting bile-pigments in the urine he commends Rosenbach's method, but warms the filter. He suggests a new use of the iodine value of the urine (the amount of iodine absorbed by 100 grammes— $3\frac{3}{8}$  ounces—of dry urinary matter), in the estimation of the bile-pigments. The absorbent substances are the bile-pigments, substances like the phenols, etc., and especially uric acid. In urines where there are the normal constituents the iodine is from 7.3 to 7.8; in the presence of much bile-pigment it may rise to 17.4.

Grocco<sup>589</sup><sup>2</sup> refers to an error in the estimation of albumen in icteric urine. He published certain researches upon this subject as early as 1884,<sup>616</sup> and showed that in certain jaundiced urines

the ordinary clinical reagents for albumen, as heat, nitric acid, or the solutions of Roberts, Tanret, and Esbach, may afford an abundant precipitate without the urine being actually albuminous. This precipitate, apparently albuminous, obtained by the heat and acids, is soluble in alcohol and fails to give the biuret reaction. It is made up of the bile-pigments, especially biliverdin. To avoid this source of error it is sufficient to treat the urine with one-fiftieth or one-thirtieth of its volume of strong acetic acid, leaving it in a cold place for a number of hours; then to filter off the precipitate which has formed, and to test the filtrate in the ordinary manner. It would be well first to make quite certain, by the addition of a little more acetic acid, whether precipitation of the biliary matters was complete before applying further tests. Guillaume-Gentil<sup>197</sup><sub>Apr.</sub> contributes a paper upon the recognition and estimation of the various albumens, in which he reviews the best-known methods in a clear and concise manner, but does not add anything new to the subject.

#### HÆMATURIA.

*Renal Hæmophilia.*—A case of this nature was recently brought forward by Senator.<sup>4 15 90 112</sup>  
Jan. 5; Feb.; Mar.; Mar. A young lady of 19 years of age had had hæmaturia for as much as two and a half years before consulting him. At first it occurred only about the periods of menstruation, and had been regarded as a form of vicarious menstruation, at that time her physician finding only a hæmoglobinuria. After this nearly two years intervened, and then the hæmaturia re-appeared, apart from menstruation and in large amount. It continued for six months without interruption, and was a true hæmaturia. The ordinary causes of hæmaturia from the lower urinary tract could be excluded, and there were no signs pointing to the usual localized causes of renal hæmaturia. Careful examination, by means of the cystoscope, showed blood coming from the right ureter, clear urine from the left. There was a strong history of hæmophilia on the father's side, and after every effort to stop the bleeding had failed Senator had advised the removal of the right kidney. This was done; the urine remained bloody for one or two days after the operation; and since then has been quite normal. The excised kidney showed small collections of blood in the tubules, but was otherwise apparently

healthy. Senator refers to 2 somewhat similar cases recorded by Sabbatier<sup>91</sup><sub>p.62, '88</sub> and Schede. In neither was anything abnormal found in the kidney excised, but in neither was there a family history of hæmophilia, as in Senator's case.

*Parasitic Hæmaturia.*—Nitze<sup>41</sup><sub>Feb. 5</sub>; <sup>88</sup><sub>May 13</sub>; <sup>22</sup><sub>Feb. 18</sub> records the case of a boy of 15 years of age, affected with hæmaturia from the influence of the *Distoma hæmatobium*. Besides this boy an older and a younger brother also suffered from a similar affection. He had acquired the trouble in the Transvaal, where his father had lived as missionary. The urine always contained numerous red and white blood-corpuscles, and in the lower part of the glass it usually contained some of the ova of the worm. The writer referred to the neoplastic formation caused in the bladder (and sometimes in the lower intestine) by the ova and embryos of the parasite, in which he was corroborated by Virchow, who stated that he had a bladder showing large polypoid excrescences caused in this manner, which he had received from Bilharz, the discoverer of the parasite. Castle<sup>6</sup><sub>Apr. 25</sub> speaks of hæmaturia as a common disorder in and about Zanzibar, both among the natives and Europeans. Both parasitic and non-parasitic forms are met. The former is caused by the parasite above named (*Bilharzia* or *Distoma hæmatobium*), and is met usually in males, always those under 30 years of age. All cases are directly traceable to drinking-water from two small rivers. Europeans boil and filter this water, and as a result do not suffer so much as the natives. The non-parasitic variety is of the form usually described as paroxysmal hæmoglobinuria.

Boyd<sup>6</sup><sub>Oct. 24</sub> calls attention to the hæmaturia which not infrequently follows the too-free use of rhubarb (pie-plant). The origin of the hæmorrhage in these cases is apparently due to actual renal lacerations in the excretion of the crystals of oxalate of lime, in which substance this plant is particularly rich. The urine contained, besides the blood and oxalate-of-lime crystals, albumen and tube-casts covered with blood and epithelium, as well as crystals of oxalate. There was pain in the back; the patient complained of headache and slight fever, and the entire appearance of the case indicated the existence of actual nephritis.

A case of renal hæmaturia dependent doubtless upon vaso-motor failure, acting especially in the kidney through reflex nervous causes, is mentioned by Wilkins.<sup>44</sup><sub>Aug.</sub> A woman in preg-

nant condition was the subject of hæmaturia and pain in the back, occurring in paroxysms. There was not sufficient reason to suppose the existence of renal calculi, and the paroxysmal nature negated its entire dependence on pressure from the enlarged uterus. The last attack occurred during the labor, the woman having become greatly worried lest the physician should not arrive in time to be of service to her. A second case, regarded by the writer as reflex in its origin, presents the possible additional factor of an infection. It occurred in a little girl of 5 years of age, just recovering from the effects of an attack of scarlet fever. She had a discharge from the right ear, and back of the ear was a superficial abscess. The urine at this time was dark and contained both the corpuscular elements of the blood and the free coloring matter. Evacuation of the abscess was followed by a clearing up of the urine; a neglect of a single day to clear out the abscess-cavity was followed by hæmaturia and hæmoglobinuria once more, quickly disappearing after the cavity had been washed out. It seems probable that in both these cases the vasonervous element was of causative value, although the influence of other factors can by no means be overlooked, and it seems questionable whether the author is justified in regarding at least this last-named instance as one of reflex hæmaturia.

*Extra-renal Hæmaturia.*—Otis, <sup>245</sup><sub>Nov.</sub> in a paper upon hæmaturia, mentions the points of diagnostic difference between the hæmaturias from various parts of the urinary tract, as indicated by such signs as the time of the hæmaturia as related to the rest of micturition, the existence of clots of the shape of the ureters, or of short, round clots which more likely form in the bladder. He states that where the specific gravity of the urine is low the hæmorrhage is apt to be renal; where it is high, the lower urinary passages are usually the seat of origin. Vesical hæmorrhage is also indicated by the existence of ammoniacal fermentation, according to this writer. Where the examination of the urine in relation to these points and by the microscope is negative, he counsels the use of the cystoscope.

A marked case of hæmaturia, arising from the passage of a calculus along the ureter, is mentioned by Martin. <sup>22</sup><sub>Feb. 18</sub> The case presented no especial peculiarity beyond the sharpness of the hæmaturia. Létienne <sup>31</sup><sub>Dec. 18, '90</sub>; <sup>19</sup><sub>Mar. 7</sub> calls attention to a rare cause of extra-

renal hæmaturia in typhoid fever. The hæmorrhage usually occurs without premonition and is painless. The blood, in the cases observed by this author, was uncoagulated and imperfectly mixed with the urine. The symptom may recur at each micturition, continuously, may appear but once, or may recur several times at irregular intervals. It usually occurs late in the course of typhoid fever, although it may occur at the onset, as in a case of Lecorché's. It is not followed by reduction of temperature, as intestinal hæmorrhage in typhoid, the fever sometimes being augmented from the resorption of septic matters. As a rule, the occurrence of hæmorrhage in the urine of typhoid cases is of grave prognostic significance, although, in a case otherwise favorably progressing, a single mild hæmaturia is of little importance. The lesions which provoke the hæmorrhage appear as ecchymoses, nipple-like prominences, discrete or grouped ulcerations, and gangrenous patches in the mucous membrane of the bladder. Fournier<sup>230</sup><sub>Oct.</sub> presented before his class a young man who had been passing bloody urine for about a month without interruption. No other cause for the condition could be found but an extreme sensitiveness of the prostatic urethra. Questioning elicited the fact that he had been married but two months, and had exercised the sexual function to an excessive degree ever since. Fifteen coitions were performed the night of marriage, and since then the act was daily done three or four times. To Fournier's mind the hæmaturia was clearly due to a congestion of the vesico-prostatic vessels, which had become almost continuous from the constant sexual excitement. The man's bride had not, however, been at all affected.

*The Blood in Hæmaturia.*—Rosenstein<sup>1026 245</sup><sub>B.2,H.2; June</sub> mentions the fact that there have been a number of endeavors to recognize, by the character of the blood in hæmaturia, the position of its origin in the urinary tract. As early as 1867 Traube believed that amœboid movement of the corpuscles and segmentation of the same as diagnostic of renal hæmaturia, but later investigations showed that these phenomena were due to the constitutional condition, and were present in both renal and vesical hæmorrhage. Traube regards the appearance of the shells of the red corpuscles, the "shadow rings," or "ghosts," as a diagnostic sign of renal hæmorrhage, but it is probable that the length of time that the corpuscles are in contact with the urine has much to do with this.

The author brings forward, as a new sign of diagnostic importance, the abundant occurrence of microcytes which he has found in vesical hæmorrhages from neoplastic formations. It has been held that microcytes are artificial products forming on the cover-glass, but in a case mentioned by Rosenstein they were observed in the urine immediately after its evacuation, and evidently resulted from the new growth of vessels in a neoplasm of the bladder. He mentions a case where, in a man of 66 years of age, a hæmaturia had persisted for two years, and among the ordinary blood-cells a large number of cells of a diameter of but two micromillimetres existed, and were without central depression. Later, fragments of a new growth appeared, and at the autopsy a papillary cancer of the bladder was found. In other cases of benign papilloma numerous microcytes were found.

Orth is the authority for the belief that the kidneys normally excrete the altered corpuscular elements of the blood. Some time since his views were opposed by Wyssokowitsch, who looks upon the occurrence of such corpuscles in the urine as due only to local changes.

Orth <sup>69</sup><sub>Mar. 12</sub> has replied to this position of Wyssokowitsch, objecting that the latter had only examined the bladder-urine, and not that directly obtained from the renal tubules. These blood-elements, he says, may easily be held on their way to the bladder and be broken up before ever reaching it. He states that particles of coloring matter, as cinnabar and other substances, have been known to be passed through the kidney without causing any appreciable alteration of its structure, and that it is probable that bacteria are thus expelled from the organism also. If these are possible the possibility of his view must remain fixed.

#### HÆMOGLOBINURIA.

The views which have from time to time been expressed in this department as to the classification of hæmoglobinurias into but two great divisions—hæmatogenous and nephrogenous—are in no way altered by the various publications upon the subject during the past year. The clinical divisions of paroxysmal, toxic, malarial hæmoglobinurias, etc., are, of course, adhered to, because of the predominance of this or that clinical feature; but the former arrangement possesses the advantage of indicating clearly the lines

of discussion which have separated the thought of the teachers on the subject. Delabrosse,<sup>203</sup> for example, divides the condition into *true* and *toxic hæmoglobinuria*. In the first group are "those which seem to occur spontaneously;" they are divided into paroxysmal, periodic, that after Bright's disease, and the hæmoglobinuria with cyanosis and jaundice in the newly born. The second group follows certain intoxications. The arrangement in this instance fails greatly of its purpose, since, in the first place, many of the periodic, paroxysmal, Bright's disease, and icteric hæmoglobinurias in the newly born are clearly the result of toxic destruction of the blood. Krukenberg<sup>317 154 26</sup> relates a case of hæmoglobinuria of hæmatogenous origin from the effects of an intra-uterine washing with carbolic acid. The case was one of abortion, in which it was necessary to curette the mucous coat of the uterus. This was done under chloroform, and the uterus washed out with 2.7-per-cent. solution of carbolic acid. This application was followed by an attack of asphyxia, which was at first attributed to the chloroform. Respiration was restored with some difficulty, and the coma disappeared after several hours. The urine was of a reddish coffee color after the operation. In about four hours unconsciousness returned. On the second day jaundice became marked, and there was swelling of the spleen. Hæmoglobinuria persisted. On the eleventh day the patient died, after a number of rigors having appeared on different days. On section there was found a putrid endometritis and acute parenchymatous nephritis, with infarction of the urinary tubules with hæmoglobin. While it is probable that the primary hæmoglobinuric manifestation was due to the action of carbolic-acid absorption, the later and graver conditions seem to one to depend rather upon the septic condition generated from the offensive endometritis.

A typical case of paroxysmal hæmoglobinuria is contributed by Brunelle.<sup>14 181</sup> It occurred in a man who acknowledged the three taints of malarial fever, syphilis, and alcoholism. For eight years, every winter, upon the least chilling, occurred paroxysms of hæmoglobinuria. The paroxysms began with chilly sensations, followed by fever and sweat. The chilly sensations were accompanied by the sensations of the "dead finger," loss of sensation in the extremities, and cyanosis of the nails—these lasting for about half an hour; the patient then warmed up, and fits of coughing

and vomiting occurred. The paroxysm continued for about six hours in all. It was followed, as a rule, by slight feelings of tire, depression, and headache. About two hours from the beginning the urine would start to darken in color. Sometimes the patient became jaundiced for five or six days after a severe paroxysm. The skin was pale; there could be heard an anæmic murmur over the vessels of the neck, but not over the heart; the liver was enlarged, the spleen normal; and there were traces of albumen in the urine. The attacks could be easily induced and their severity regulated by the degree and duration of exposure. In one of these seizures temperature was found upward\* of 2 degrees above normal; the number of red cells in the blood was not sensibly changed; dark urine appeared an hour and a half from the commencement of the attack; it contained methæmoglobin, no red globules, but a quantity of large hyaline casts. The quantity of urea was increased and a transient albuminuria followed the attack. In the discussion of this paper, Wertheimer announced that he had succeeded in producing a paroxysmal hæmoglobinuria in a rabbit.

Kast<sup>34</sup><sub>May 19</sub> records a case of periodic hæmoglobinuria in a man who had had at one time an attack of diphtheria, from which cardiac fault persisted. Nothing else in his history bore in any manner upon the hæmoglobinuria. Some time before consulting Kast, the patient had noticed that after excessive walking he passed a dark, beer-brown-colored urine, but that after a few hours the excretion again cleared up. Under the microscope there were no blood-cells, but the spectroscope showed clearly the lines of hæmoglobin. The author notes the rarity of muscular exhaustion as a cause of paroxysmal hæmoglobinuria; cold had no influence on the case in any degree.

Under the term "malarial hæmoglobinuria," the editor of the department prefers to include all cases, whether purely hæmoglobinuric or actually hæmaturic, which owe their origin to the influence of malarial fever. The confusion of these terms is, perhaps, excusable in a degree, but in the vast majority of cases the condition is primarily one of hæmoglobinuria,—a hæmoglobinuria of hæmatic or systemic origin,—and not due to corpuscular changes after the line of renal vessels has been passed. It is true that corpuscular elements so occur in the urine of a proportion of cases,

but it is invariably a complication of the previously existing hæmoglobinuria or a consequence, the kidneys throwing off the broken-down cells as a necessity to the proper condition of the organism. The papers which appear in the literature of the past year upon this subject are, almost without exception, from writers resident in the Gulf or lower Mississippi-basin States, and the point which in almost every instance attracts the most attention of the writer is the plan of treatment.

An excellent paper, based upon his own 23 years of experience with the condition, is contributed by Chambless.<sup>199</sup> It is more common in males than in females, and is rarely met among negroes. The author never saw a case of malarial hæmoglobinuria in a patient under 4 and in but 1 over 30 years. New-comers from high, non-malarial regions do not seem to acquire this form of paludism during the first year, although they may have been repeatedly subjects of chills; consequently, the writer believes that long residence in malarial districts is necessary. He states that, in his experience, the condition occurs in the autumn months in at least 80 per cent., and that he cannot recall having seen a single case in the months of March and April. One attack seems to predispose to others; for the most part second attacks are lighter, but after frequent attacks the patient is apt to succumb. The attack is ushered in with an ordinary chill very often, the hæmoglobinuria showing at the first micturition after the chill. The jaundice which appears is usually a sign of prognostic value; the more rapidly it develops, the deeper the hue, the graver the case. In very malignant cases bronze spots appear, especially about the eyes,—a sure harbinger of death. Nervous prostration is pronounced, but delirium is rarely met. Irritability of the stomach becomes pronounced on the second day of the attack, if not earlier; and vomiting ensues, first of a green, bilious character, later of a dark, “coffee-grounds” color (particularly if the case be approaching a fatal termination). Thirst, hiccough, constipation, disinclination to talk, a sighing respiration are symptoms characterizing the height of the attack. In the prognosis the fatal signs are the jaundice deepening into a dark bronze in spots, black vomit, hiccough, and suppression of urine. The favorable cases are known by their less-intense jaundice (only a yellowish or greenish tinge in the mildest), the clearing of the urine, and a

fall in temperature. But even in these latter another chill and rise of temperature, renewing all the symptoms, may jeopardize the patient's safety.

As to the treatment, Chambless believes that in the early and free use of quinine depends the safety of the patient. He recommends as a first dose, if the temperature be above 103° F. (39.5° C.) 20 grains (1.3 grammes), continuing its exhibition in 10-grain (0.65 gramme) doses every three hours afterward for twenty-four hours, then dropping to 5 grains (0.32 gramme) every three hours. If quinine blindness follow, the drug is to be stopped. With each of the first two doses he combines 2 grains (0.13 gramme) of calomel, followed, in ten hours after the last dose of calomel, by a Sedlitz powder; but he discourages drastic purgation as apt to induce dangerous vomiting. To allay the vomiting he uses bismuth and opium, but toward the end of the third or fourth day he endeavors to give the stomach absolute rest, as he has been unable at this period to allay the symptom by any known means. When suppression of urine or cardiac weakness threatens, he occasionally administers digitalis. Throughout the course of the case he urges that the bowels be kept gently open.

McHatton <sup>760</sup><sub>June 13</sub> describes the urine as of a brownish-red, varying to a brownish-black color, of normal odor, of a specific gravity ranging from 1012 to 1034, and of acid reaction. It always contains albumen, and permits a granular sediment to deposit, composed of *débris* of red blood-cells. Very few red blood-globules are distinguishable, but the coloring matter is present in large quantities, and may readily be demonstrated. Casts of a hyaline or granular character are not infrequent, and uric-acid and oxalate-of-calcium crystals and renal epithelium are commonly present. This writer, too, advises the use of quinine in large doses. For the treatment of the symptomatic indications, he suggests morphia for the vomiting and abdominal pains, hot poultices for the pain, and nitrite of amyl for the hiccough. As to the question of the origin of the condition from ill-advised employment of quinine, he states that it occurs where no medicine has been taken at all, and that, rather than increasing the severity of the symptoms, his experience has led him to believe that its use is the only specific treatment for the condition.

It is exceedingly curious that there should be such a difference

of opinion as to the value of this drug, and one is almost led to believe that different disease conditions are described by the various writers. Contrasted with the foregoing opinions, a whole group of writers may be quoted as decrying in the strongest terms the use of the drug, avowing that by it the hæmoglobinuria is dangerously increased—Dunagan,<sup>74</sup> Sargent,<sup>186</sup> McCargo,<sup>74</sup> Davis,<sup>74</sup> Parham,<sup>117</sup> Meek,<sup>12</sup> and Douglas.<sup>12</sup> Most of these physicians urge the value of calomel in contrast to quinine,—a drug which is looked upon with extreme caution by McHatton. Meek<sup>12</sup> bases his treatment upon hyposulphite of sodium, given in drachm (4 grammes) doses every three hours, until the patient is freely purged, and in smaller doses for its constitutional effect. Morphine and atropine hypodermatically, to quiet the stomach, with a blister over the epigastrium, if necessary; abundance of water, as a soothing diuretic; cupping over the loins, milk or buttermilk diet, and close rest in bed are the agencies upon which he relies. Wheeler<sup>74</sup> uses calomel in the beginning of the case, and, after the bowels are well regulated, he employs moderate doses of quinine, in the form of the bisulphate, hypodermatically. He places the most importance, however, upon the calomel.

Gavin<sup>199</sup> uses large doses of calomel, as much as 30 grains (2 grammes) to an adult, until free purgation is reached. After this he permits no medication, except as symptoms arise, and, as a rule, the attack passes off. He then follows it up with sufficient quinine to ward off the next paroxysm. He cautions against the use of opium before the urine has cleared off, his experience leading him to fear a fatal termination in cases where it is used at this period. In this caution he is, however, opposed by others, and Morris<sup>199</sup> directly contradicts him as to the value of the drug in these cases. The latter advises, as a method of great value, the hypodermatic injection of  $\frac{1}{50}$  grain (0.0013 gramme) of strychnine every three hours until the physical effects of the drug are obtained.

These opinions, which ascribe the hæmoglobinuria to an influence of quinine, at least in part, are upheld by observations recorded by Coromilas.<sup>24</sup> He reports 6 cases in which hæmoglobinuria repeatedly followed the administration of quinine. None of the patients could take the sulphate, 2 could not take cinchona in any form, 1 not the salicylate, 1 not the valerianate, 1

not the hydrobromate of quinine, without the occurrence of hæmoglobinuria. Carreau<sup>996</sup><sub>Aug.</sub> has published an account of this form of hæmoglobinuria, reviewing the statements made by various Greek and Italian observers (see previous editions of the ANNUAL).

#### GLYCOSURIA, REDUCING SUBSTANCES, ETC.

Jumon<sup>31</sup><sub>June 25</sub> publishes an article in review of the work, to be mentioned presently in this section, by Jastrowitz, Posner and Ebstein, Moritz, and Havelburg. A paper of similar nature, covering the most prominent methods, is contributed by Krauss.<sup>2008</sup><sub>'90</sub> <sup>74</sup><sub>Dec., '90</sub>

*Trommer's Test.*—Jastrowitz<sup>113</sup><sub>Feb. 22</sub> <sup>69</sup><sub>Feb. 12, 19</sub> <sup>147</sup><sub>Sept.</sub> has long been engaged in the study of the value of Trommer's test for sugar. This reagent gives a yellow- or orange- colored precipitate with urine which contains as much as 0.6 or 0.8 per cent. of sugar; but where the quantity of sugar is below 0.5 per cent. no precipitate is formed. While there are other tests more delicate, the writer regards them as inferior to this test in reliability and practicability for the physician. When the percentage is small, the patient may be instructed to pass his urine in the morning, and then partake of a breakfast composed largely of starchy food and cane-sugar, and after several hours void urine for examination. In this manner the amount of sugar in the urine is increased to an amount which may be recognized by Trommer's test. An important part of the test is the microscopic test of the precipitate, which contains octahedral, tetrahedral, and round crystals, characteristic of the presence of sugar. Before conducting the test the phosphates must be removed by adding an equal quantity of caustic soda, and decanting the urine after precipitating the former. In urine containing less than 0.5 per cent. of sugar, a yellow color is obtained on heating to the boiling-point. When there is 0.6 per cent. or more sugar, the urine becomes tricolored,—red above, yellow next, and blue below; this tricolor appearance becomes more and more marked with the increase in the amount of sugar.

*A-Naphthol Test.*—Posner and Ebstein<sup>4</sup><sub>Feb. 23</sub> <sup>112</sup><sub>Oct.</sub> recommend that, in using  $\alpha$ -naphthol in estimating the presence of sugar in the urine, the method of Luther be followed. A drop of the liquid to be examined is mixed with a drop of a 10-per-cent. solution of  $\alpha$ -naphthol dissolved in chloroform, and the mixture diluted with 1 cubic centimetre ( $15\frac{1}{2}$  minims) of water, to which, in a test-tube,

0.5 cubic centimetre ( $7\frac{3}{4}$  minims) of concentrated sulphuric acid is added. A violet circle appears at the line of contact, even though the liquid to be examined contains no more than 0.03 per cent. of sugar. The purest chemicals are to be used. Even urine not abnormal to other tests may show this violet tint. Does this go to show the presence of glucose normally in the urine? or is it produced by other carbohydrates, or by some albuminates? Posner and Ebstein say it matters little; it is only necessary to have the urine under examination diluted previously (1 to 10, as a rule), when any reaction clearly indicates a pathological glycosuria. Working under such conditions, using small test-tubes, pure chemicals, working with a urine previously freed from albuminoid matters, the reaction is one of extreme sensibility. They claim the advantage of using it without heat, and of its acting in very small amounts of urine. In order to get quantitative results the urine is to be diluted to that point where it gives a barely appreciable reaction (0.02 per cent.); and multiplying the fraction 0.02 by the number expressing the dilution of the urine the percentage is obtained. This result is practically, if not scientifically, correct. For increasing the delicacy of the method the authors suggest that instead of diluting the urine the reagent be diluted, and a series of test-colors, obtained from waters containing known amounts of sugar, be compared with the urine results, for the purpose of thus estimating the proportion of sugar in the latter.

In a second paper these writers <sup>84</sup><sub>Oct. 24</sub> suggest that, in estimating the sugar excreted by a diabetic patient, single estimations are not reliable and fair; but the estimations should be made with different samples during the day, and for a number of days, so as to get a sort of glucose chart, marking with a curve, as in temperature charts, the variations in the excretion. They believe that in this manner valuable knowledge of the course of the case may be obtained, having a decided value in the prognostic bearing of the case.

*Fermentation Test.*—Moritz <sup>34</sup><sub>Jan. 13</sub>; <sup>90</sup><sub>Feb.</sub> advises the following simple method of performing the fermentation test in diabetic urine: An ordinary test-tube is filled to the brim with a mixture of urine and yeast; an India-rubber stopper, holding a glass tube curved twice at right angles, is then inserted into the mouth of the test-tube. The urine displaced by the stopper flows into the curved glass

tube passing through it. The test-tube is inverted, the outer end of the glass tube reaching as high as the bottom of the test-tube, and placed for eighteen or twenty hours in a warm place. If sugar be present fermentation occurs and gas collects at the top of the tube. A very small amount of gas develops, even in normal urine, from the yeast decomposition; it develops as well when yeast and pure water are in the tube. It is well, therefore, to use two control tubes. One of these is filled with normal urine and yeast, so that one may estimate the proportion of gas from the yeast. Another control tube should contain the suspected urine and glucose added to see if the yeast is active and can develop in the suspected urine (which might be somewhat antiseptic from the presence of salol or some such substance). In all these tubes, of course, the same amount of yeast is to be employed. Along with the fermentation test the author advises the employment of Nylander's, or some other reduction test, in order that the diagnosis should be absolutely sure. Urine which responds to both, but which, after fermentation, does not answer to Nylander's reaction, surely contains sugar. Urine which responds to the latter, and not to fermentation, does not contain sugar, but some other reducing body.

The well-known saccharimeter of Einhorn is described by the inventor, at the request of Dujardin-Beaumetz.<sup>67</sup> Its principles are so well known that it is scarcely necessary to describe the instrument further here.

The arão-saccharimeter is a new instrument devised for utilizing the fermentation of a diabetic urine for estimating the amount of sugar present. Its inventor is Joseph Schütz,<sup>34</sup> of Frankfort. Its construction and method of employment is, briefly, as follows: A bottle-shaped tube with long, narrow neck is provided; upon the neck a scale is marked out, ranging from a specific-gravity mark of 1010 below to 1040 or more above, with proper intermediate divisions. Upon the body of the flask, at near the position of two-thirds its capacity, is a mark; this mark is absolute, and the marks upon the neck are dependent upon the depth to which this flask-shaped tube will sink in pure water at proper degrees of temperature. Urine is poured into the tube to the two-thirds mark, and on immersion in the water its density may be read off. The ferment being added and the specific weight noted, the ap-

paratus is placed aside for the fermentation to occur. With the fermentation occurs a loss in specific weight, and the tube floats higher. Estimation with known quantities of sugar has permitted the scale to be also marked indicating the amount of sugar lost with the lowering of the specific weight, and on one side of the scale the marks indicate specific gravity, on the other the percentage of glucose. This ingenious instrument is capable of a number of uses by slight modifications in the markings on the neck and body of the tube; albumen could easily be reckoned by the specific gravity before and after coagulation of the albumen (after the plan of Ruppert and Zahor), and urea might easily be estimated by the hypochlorite or hypobromite solution (following the suggestions in Fowler's modification of the hypochlorite method).

*Phenylhydrazin Test.*—Havelburg<sup>319 16</sup><sub>No. 6; Aug.</sub> suggests a modification of this test, which he considers gives more reliable results and is easier to carry out than the original method of Fischer or von Jaksch. About 20 grains (1.3 grammes) of phenylhydrazin and about 30 grains (1.94 grammes) of sodium acetate are placed in a test-tube. The tube is filled almost half-full of water and slightly warmed; an equal volume of urine is added; a little chloroform is finally added and shaken up with the other fluids. If the test-tube be now permitted to stand the chloroform soon settles to the bottom, and if there is sugar present a layer of fluid forms above it containing crystals of a canary-yellow color. The crystals can be removed with a pipette and examined microscopically. If there be a moderate amount of sugar present the yellow zone is quite visible with the naked eye. The reaction takes place better if before the chloroform be added the mixture be boiled; but in this case caution must be had not to add the chloroform before cooling the mixture, lest an explosion take place.

*Fehling's Solution.*—Beugnies-Corbeau<sup>293</sup><sub>June</sub> regards this reagent as a most valuable diagnostic agent, in spite of the diversity of substances which may react upon it. In general, it may be said that there are four groups of chromatic reactions, which may occur together or apart: 1. *The white reactions*, in cold or warm solutions, caused by various salines. 2. *Yellowish-red reactions*: cold (occurring in about half an hour), due to alkaptose; warm, sugar, glycerin, the carbohydrate body of Marshall (glycosuric acid), the sinistrose of Leo, allantoin, the formates, hydrochinon,

pyrocatechin, and resinous substances. 3. The *green reactions*: *cold*, due to dextrin or lactic acid; *warm*, to the same bodies and to creatinin and inose. 4. The *brown or violet reactions*: *cold*, albumen; *warm*, albumen, dextrin, cystin, and myosuria. The author tabulates the differences in these various reactions to great length, but it is probable that for clinical purposes a classification into groups, such as above, is really more reliable than an endeavor to clearly separate some twenty differences in the action of this single reagent. This table is as follows, leaving out a few unimportant features:—

## A. COLD REACTIONS.

- |  |                       |
|--|-----------------------|
| 1. Instantaneous precipitation of a white or greenish mass on the addition of the reagent drop by drop . . . . .                         | Salts of uric acid.   |
| 2. No precipitation . . . . .  | Basic urine.          |
| 3. Violet or mauvé coloration . . . . .  | Albumen, peptones.    |
| 4. Marked green color, developing quickly . . . . .  | Lactic acid, dextrin. |
| 5. A reddish-yellow precipitate, beginning about a quarter of an hour after addition and complete in about three or four hours . . . . . | Alkaptose (Schmidt).  |
| 6. Wine color, becoming red on heating . . . . .   | Rhubarb, santonin.    |

## B. HEAT REACTIONS.

- |  |   |
|--|---|
| 1. Rapid yellow color, followed by a greenish hue, always absent if care in alkalization is taken . . . . .  | { Lactic acid, alkaline lactates,<br>dextrin.   |
| 2. Same reduction; becoming, with slight heat, yellow, red, dark red, brown . . . . .  | Dextrin.  |
| 3. Reaction requiring heating for five to ten minutes, with adherence of a yellow matter to the tube and a greenish color to the liquid . . . . .                | Creatinin.  |
| 4. This reaction requiring ten to twenty minutes for development . . . . .   | Inose.  |
| 5. Liquid and sediment of a yellow color . . . . .   | Urobilin.   |
| 6. Heating a small part of the tube and decolorizing, which decolorization persists when cool . . . . .  | Indiglucin.   |
| 7. Decolorized band from heating; dark-brown color on cooling, with black precipitate . . . . .  | Cystin.   |
| 8. Rapid brown coloration . . . . .  | Myosuria.   |
| 9. Slow reduction in cold, rapid in warm, with black or violet precipitate . . . . .   | Albumen.  |
| 10. Reduction reddish or reddish-yellow, more marked when cold, with a precipitate the upper layer of which is more marked than the rest; red or brown . . . . . | { Sugars, sinistrose, Marshall's<br>substance, glycerin, allanto-<br>toin, formates, hydrochin-<br>on, pyrocatechin, essences,<br>and resins. |
| 11. Green color on addition of chloride of iron . . . . .  | Pyrocatechin.   |
| 12. Burgundy-red color with chloride of iron . . . . .   | Glucoses.   |
| 13. Urine with violet odor, with a precipitate on addition of $\text{HNO}_3$ , which is soluble in alcohol . . . . .   | Turpentine.   |
| 14. Same urine; precipitate not entirely soluble in alcohol . . . . .  | { Turpentine plus glucose and<br>albumen.   |
| 15. A urine becoming rose-colored or violet on the addition of $\text{HCl}$ or $\text{HNO}_3$ , and reducing copper solutions poorly . . . . .                   | Copaiba.  |
| 16. A urine becoming red with same treatment . . . . .   | Cubebs.   |

*Reducing Substances in the Urine of Children.*—Neumann <sup>158 51</sup><sub>H.6.6, July</sub> concludes, in a paper upon the presence of reducing substances in the urine of children, that such substances are present in all cases of children. It may be very small in quantity with some, but is sufficient for determination. Carbohydrates are present in the urine of children. Under certain pathological conditions the quantity of reducing substances may be increased. This is especially the case in severe digestive disorders and nerve

diseases. The same symptoms which occur with diabetes in adults occur in children, along with an increase of reducing substances.

*Alkaptonuria*.—Kraske and Baumann<sup>83 34 32</sup>  
v. 15, p. 228; Jan. 6; Sept. narrate the case of a man aged 68 years with symptoms referable to cancer of the prostate. His urine when freshly passed was of a straw or amber color, but after standing for a time gradually turned an olive-green, until at the end of twenty-four hours it had become a greenish-black; at the same time it underwent an ammoniacal change. The patient affirmed that these changes took place in his urine from childhood, at some times more markedly than at others; but he had noticed nothing in his manner of life that influenced it. Alkaline cupric solutions became reduced in the cold, at first without separation of cupric oxide, but if larger quantities of copper were added precipitation took place. On adding a few drops of the urine to an ammoniacal silver solution a precipitation of metallic silver took place. On the other hand, the bismuth test was negative. On addition of ammonia or soda solution the urine turned to a greenish-brown color; if the urine was allowed to stand after alkalization it could be seen that the coloration began at the surface. On shaking, the color changed rapidly to dark brown or black. These reactions showed the presence of pyrocatechin, which one of these authors believes is present in normal urine. But the first test showed that the reducing substance was very acid and could be extracted from the urine by ether. On evaporating the ethereal extract a brown syrup was left, soluble in water, and giving all the reactions formerly shown by the urine. This being neutralized with sodium hydrate, or even rendered slightly alkaline, the ether no longer took up any of the reducing substance. The condition of the urine thus corresponded with what Boedeker called alkaptonuria. Alkapton, however, has not been obtained pure, and has been identified with various other substances.

Müller and Ebstein, Fürbringer, and others think it is pyrocatechin, and Boedeker himself came to accept this view. W. G. Smith, however, showed that the reducing substance in alkaptonuria acted as an acid, which he regarded as pyrocatechinic acid. Later, Kirk described the acid as differing from pyrocatechinic acid, and called it urrhodinic acid. Probably this is the same acid which Marshall, of Philadelphia, obtained from an alkapton urine

(glycosuric acid). Still later, Kirk obtained a pure acid,—uro-lencic acid ( $C_9H_{10}O_5$ ),—the properties and composition of which he described. Undoubtedly urrhodinic, glycosuric, and urolencic acids are identical. It has been discovered that the acid is formed from tyrosin, and is also increased by meat diet.

*Urochloralic Acid*.—Chloral is eliminated in the urine in the form of a peculiar acid, urochloralic acid ( $C_8H_{11}Cl_{13}O_7$ —*Musculus* and *Mering*), which has strong reducing and levogyric properties. The method usually given for its estimation is too complicated for practical use. Wagner<sup>359 276</sup><sub>p.115; Mar. 5</sub> gives the following method of procedure for its recognition: About 20 cubic centimetres ( $5\frac{1}{4}$  drachms) of urine are passed through a moistened filter to separate as far as possible fatty globules held in suspension. It is then concentrated to about one-half volume on a water-bath, acidulated with sulphuric acid, and mixed thoroughly, after cooling, with once its volume of alcohol and twice its volume of ether. It is then distilled and the residue thoroughly washed with warm alcohol. This solution filtered and perfectly clear, precipitation is accomplished by a large excess of ether. After twenty-four hours the sides of the flask are covered over with a white crystalline substance made up of minute tufts of delicate needles. The ether is then decanted and the crystals taken up in distilled cold water, and the solution after filtration will be found to respond to the usual reduction tests. As the alcohol-ethereal extract may contain a small amount of glucose, it is necessary to find absolutely the chlorine in the urochloralic acid. The liquid, having been acidulated with nitric acid, may be for this purpose treated with nitrate-of-silver solution, when a distinct deposit of chloride of silver is obtained.

*Acetonuria*.—Ruttan,<sup>282 130</sup><sub>Mar.; Mar.</sub> referring to the tests for acetone in the urine, commended as the best of all, in his opinion, Leben's iodoform test, both for delicacy and ease of application. The earthy phosphates should first be precipitated by caustic soda or potash before applying the test. Having filtered off the precipitate, a few drops of a strong solution of iodine in iodide of potash should be added to the urine, and then an alkali added, such as caustic soda, until the solution is just decolorized. A yellow opacity, with precipitation of iodoform, occurs if acetone be present. Nothing else that occurs in the urine, except acetone, is able to give this

precipitate of iodoform, without warming. When but small quantities are present the urine should first be made acid with sulphuric acid and distilled. When half the urine has been distilled all the acetone has been found to be in the distillate. Ruttan utilizes this method for a quantitative estimation of acetone. With a constant quantity of iodine and alkali, variations in the amount of iodoform produced indicate variations in the amount of acetone in the urine. He uses 5 cubic centimetres (80 minims) of a standard solution of iodine, 10 cubic centimetres (40 minims) of a standard solution of caustic potash, and 1 cubic centimetre (15 minims) of the distillate of the urine to be tested. The iodoform produced is dissolved out with ether in a sort of separating flask, and the aqueous mixture drawn off, and the ethereal solution measured in the flask as it is graduated from the top up. Half the ethereal solution is then run into a weighed watch-crystal, evaporated, and reweighed. The increase in weight multiplied by 0.55 represents the amount of acetone in 1 cubic centimetre (15 minims) of urine. Following this paper, Ruttan and Johnston mention a case of cerebral apoplexy in which sugar and acetone were detected in the urine. The coma had come on suddenly, and was regarded as diabetic from the urinary condition; but the autopsy revealed an extensive cerebral hæmorrhage.

As to the origin of acetonuria from intestinal derangements, Lorenz <sup>844 13</sup> <sub>Aug. 29; June</sub> concludes, from a series of investigations, as follows: the development of acetonuria from affections of the intestines of the most varied character is a phenomenon so constant that it would be well to add to the already recognized varieties of the condition a class caused by intestinal disturbances. In these cases of digestive fault it seems impossible to separate acetonuria and diaceturia, in that the differences in clinical manifestations between these substances are but slight, and really only quantitative in character, and their combination or alternation of the two conditions is almost always the case. The symptoms formerly attributed to these substances do not appear to be due to them, but to lower oxidized forms. When albuminuria exists it does not seem to be in any way dependent upon either of these substances. Acetone is to be found (sometimes in large amounts) in the contents of the stomach and intestine in many cases. There is a great difference between the primary and secondary gastro-

intestinal affections, especially of nervous origin: in the former the gastric contents almost always contain acetone; in the latter it is rarely found. In several cases oxybutyric acid was also found in the urine. It is stated by some observers that the urine of animals from which the celiac plexus has been removed shows the presence of acetone. While this is probably true, Viola<sup>900</sup><sub>July 20; Aug. 29</sub> has found that the same reactions can be obtained in the urine of normal animals.

*Oxaluria*.—Neidert<sup>242</sup><sub>June</sub> regards oxaluria as constituting a disease, and not a symptom. He mentions several cases in which this condition, marked by pronounced nervous symptoms, was not to be referred to any of its ordinary causes. Because of this absence of a known cause the writer looks upon the condition as a diseased state in itself. He confirms his views by several experimental observations. The position assumed is, however, by no means a safe one; the simple failure to refer it to a known cause does not exclude such a cause. Norris<sup>547</sup><sub>May</sub> recommends in the treatment of this condition permanganate of potash, advising as a dose a teaspoonful of a solution of 8 grains (0.52 gramme) in 2 ounces (60 grammes) of water, this to be given thrice daily. It should be given on an empty stomach, as it readily gives up its oxygen to whatever it comes in contact with.

#### CHYLURIA.

Long<sup>147</sup><sub>Sept.</sub><sup>77</sup><sub>Sept.</sub> reports a case of chyluria in a Chinaman, who had last been outside this country, upon a visit to his native home, two years since, and whose illness began six months before date of report. Repeated examination of the blood failed to show the presence of filarial embryos. On discussion of this paper Montgomery reported a second, in a Chinese woman, in whom the chyluria had followed a severe attack of gonorrhœa; no filarial embryos were found in the blood. The first case of chyluria recorded in Hungary was brought forward by Augyán.<sup>6</sup><sub>Apr. 4</sub> It occurred in a man of 34 years of age, had lasted for four or five months, and always was worse toward night, the urine passed after period of rest being sometimes quite clear. This circumstance, together with the fact that there was occasional lumbar pain, suggests a traumatic origin. No record of parasites is made. Lawrie<sup>256</sup><sub>July 30; Feb. 14</sub> reports several cases of cure of filarial chyluria from the use of

thymol in 1-grain (0.065 gramme) doses every four hours. To this the editor of this department is able to add a third occurring within his knowledge. The case occurred in Key West, Florida, having been reported to him by the physician for diagnosis. The character of the urine and history of the case suggested strongly the presence of filariæ. The blood was examined by a local physician without success, but was not sent to the editor (then residing in Philadelphia), because of the length of time required to go between these points. At the latter's suggestion thymol was administered, with the result of a rapid clearing up of the urine and return of the patient's full health.

Delfin<sup>459</sup><sub>No. 18</sub> suggests the use of bichromate of potash, in the form of Müller's fluid, in the treatment of the hæmato-chyluria which is frequently met with in Cuba and other tropical localities. This condition is regarded variously by different authorities as to its origin, but it probably owes its existence, in some cases at least, to filarial presence, as was brought out in the discussion of this paper. Several instances illustrating the favorable action of the drug are mentioned briefly. The dose is not named, but would probably not exceed a teaspoonful of a solution of 1 centigramme ( $\frac{2}{13}$  grain) in 250 cubic centimetres (8½ ounces) of water.

#### CYSTINURIA.

W. G. Smith<sup>16</sup><sub>Feb.</sub> reports a case of cystinuria in a boy of 8 years of age. The urine was said to have an orris-root odor, and to deposit a greenish sediment. Out of six examinations of the boy's urine cystin was found but once. The crystals were identified by their form, solubility in ammonia, and insolubility in acetic acid. Cystin ( $2C_3H_6NSO_2$ ), or a cystin-like body, exists in small amount in human urine as the result of proteid metabolism. No relationship exists between uric acid and cystin. Associated with cystin pathologically is the occurrence in fæces and urine of certain ptomaines, belonging to the diamine series,—cadaverin ( $C_5H_{14}N_2$ ) and putrestin ( $C_4H_{12}N_2$ ). Normal urines and fæces do not contain diamines, nor do they occur in cystin calculi. Their formation depends on the action of certain bacteria in the intestines. The exact relation between cystinuria and diaminuria is not determined. Cystinuria may persist for years without apparent harm to the health of the patient. The therapeutic indication is the disinfection of

the bowel. Picchini and Conti<sup>376</sup> <sup>2</sup><sub>Sept. 15, Oct. 24</sub> report the following case: The patient was a woman aged 29 years, who had been in full health until the age of 19, when she had an attack of acute rheumatism. At 22 she had another attack, with cardiac and pleural complications, from which she never entirely recovered. At 29 she was attacked by subacute polyarthritis rheumatica, with joint deformities; pleural effusion; dry pericarditis; general cardiac hypertrophy, with mitral stenosis; fever; hepatic enlargement. The urine was scanty, showed a trace of albumen and of urobilin, a few hyaline casts, and abundant cystin crystals. No vesical calculi were found. In the hospital her temperature became normal, liver reduced to its normal size, albumen and casts disappeared from her urine; but the cystin persisted. Daily examinations showed that the cystin amount varied with the amount of urine passed; that more was excreted during the day than during the night (contrary to Ebstein's results). Nitrogenous diet did not make any difference in the cystin excretion, but milk diet increased both cystin and total amount of urine. Alkaline treatment and mercurial inunction had no effect upon the condition. Uric-acid excretion was increased during the day, decreased at night; urea was generally diminished; sulphates about normal; phosphates somewhat diminished. Tyrosin was occasionally found in small amounts. The complexity of the disease factors here at work prevents much deduction as to the possible origin of this rare condition, the pulmonary, cardiac, and hepatic alterations, with the rheumatic diathesis, all working to produce their several results.

*Methyl-Mercaptanuria.* — Nencki<sup>273</sup> <sup>520</sup> <sup>32</sup><sub>B. 28, H. 3, 4; No. 3; Sept.</sub> found that the odorous substance in the urine after eating asparagus is methyl-mercaptan,—one of the products of the fermentation of albumen or gelatin,—and normally found in the intestinal gas. Loew thinks it is probably formed during the albuminous changes which occur at the germination of the plant. Wilks<sup>6</sup> <sub>June 6</sub> wrote recently to ask for the alleged diuretic action of this plant, mentioning that Brunton referred its odoriferous character to the decomposition of asparagin, succinic acid being one of its products. M. B. (Cantab)<sup>6</sup> <sub>June 13</sub> answers that, under the influence of the plant, the micturition is increased, but not the total amount of urine, which is frequently diminished. Tidy, in the same journal, states that the plant has usually a marked “inhibiting action.” F. R. C. S. adds

that the excretion of urine is diminished by at least one-third, and he thinks the plant has a calmative action on the sexual desire. Vicars states that in Russian Poland the plant is recognized as a diuretic, but that the amount eaten is five or six times as much as is eaten in England.

*Phenol Bodies in the Urine.*—Rumpf<sup>57</sup><sub>Oct.11</sub>; <sup>84</sup><sub>Oct.24</sub> states that the bodies left as a bromine precipitate of the urinary distillate are really not tribromphenol, as has been believed, but a mixture of various brom-phenols and kresol. He believes there is a necessity for a new method of estimation of the phenols, one that will recognize the phenols from kresol. Humphreys<sup>2</sup><sub>Mar.14</sub>; <sup>32</sup><sub>Sept.</sub> stated recently, at a meeting of the Hunterian Society of London, that urine added to a solution of potassium permanganate decolorizes the latter. He believes this to be owing to the presence of a phenol formed in the intestines during the decomposition of albumen. Retention of this substance, he believes, causes uræmia. Its normal daily amount is from 17 to 34 grains (1.02 to 2.10 grammes); the quantity being highest in the first urine of the morning, in that after a meal, and in fine, warm weather. It is reduced by a sick headache, and increased by a fever.

#### UREA.

The experiments of Schröder, Minkowski, and others have led to the theory that urea is largely and chiefly formed in the liver. It has been noted that, in ray-fish and similar forms of animals, urea is present in large quantities. Schröder has experimented recently<sup>83</sup><sub>No.14,'90</sub>; <sup>2</sup><sub>Jan.31</sub> upon the fish *Scyllium catulis*, and finds, on an average, that the blood contains 2.61, the muscles 1.95, and the liver 1.36 per cent. of urea, the blood thus containing fifty times more urea than dogs' blood. After excision of the liver, the animals may live for seventy hours, or thereabouts. In dehepatized animals the muscle contents of urea amounted to 1.85 per cent., the removal of the liver having had little or no effect on the urea in the muscles. The experiment does not bear in any special way upon the hepatic origin of urea; the writer believes that the large amount of urea in these animals is due to the insensibility of the kidneys to urea. An editorial writer<sup>99</sup><sub>Feb.26</sub>; <sup>80</sup><sub>Feb.</sub> advocates the older theory of the more general source of urea formation as the most authoritative from a scientific point of view. In favor of the theory of the hepatic origin of this substance, he cites observations,

made as early as 1846, to the effect that the urine of persons affected with chronic hepatitis contains little urea; and he quotes Brouardel, Murchison, Meissner, Bouchardat, and others as supporting this view. About the same time cases of hepatic disturbance with increase of urea in the urine were reported by Fourcroy and Vauquelin, and Fouilloux. Lecorché and Talamon argue that the decrease in urea formation attending destructive lesions of the liver attends equally every disease of long standing and any cachexia, although they acknowledge that in affections altering liver-structure the fall in urea production is greater than in chronic diseases of other organs, but they explain this on the ground of the relative size and importance of the organ in question. They also oppose careful observations of their own, where, despite such destroying lesions as cancer or diffuse venous cirrhosis, the quantity of urea remained normal; and from these facts the deduction is made that the liver may incidentally (as any other organ may) influence urea formation, yet this is not a special function of that organ, but more probably a phenomenon of disassimilation.

*Warden's Rapid Method for Urea Estimation.*—Warden<sup>6</sup><sub>Feb. 14;</sub><sup>32</sup><sub>Sept.</sub> suggests an apparatus in which the hypobromite method may be rapidly performed, consisting of a Crums tube, of large size,—making it 630 millimetres long, thus increasing the capacity to 75 cubic centimetres (2½ ounces), while the internal diameter is not modified. A stopper is fixed, by grinding, for the open end, two narrow grooves having been filed upon its ground surface parallel to its length. The small cup on the top is increased to hold 5 cubic centimetres (80 minims), and is graduated to hold 2.5 cubic centimetres (40 minims) up to a certain mark. He suggests, too, that thinner glass may be used, as he does not employ mercury in the process. On the side of the tube are graduations, indicating the percentage, marked as high as 5 per cent. The hypobromite solution is placed in the graduated tube, the stop-cock closed between the main tube and the small cup. Into the latter urine is filled to the 2.5-cubic-centimetre mark, and then the cup is filled with a brine solution to increase the gravity of the urine. Turning the stop-cock, the urine and brine quickly fall into the hypobromite solution, and by repeating the operation at intervals it may be all added and decomposed. Then, noting the mark at which the gas stands upon the graduation, the

percentage quantity is read off. Where the urine contains more than 3 per cent. of urea it is best to dilute it.

*Southall's Ureometer.*—This is a modification of Doremus's well-known clinical ureometer. Fox<sup>2</sup><sub>Nov. 29, '90</sub> praises its simplicity of construction and ease of employment. It consists of a curved tube, the longer arm closed at the end and graduated. This tube is filled with the reagent,—hypobromite of soda,—and a curved pipette, charged with 1 cubic centimetre (15 minims) of the urine, introduced through the open end, which is bulbous. The urine in the pipette is discharged through pressure on a rubber bulb, and the nitrogen-gas is measured on the graduated scale, indicating the percentage. Fox favors the use of the chlorinated soda solution of the "United States Pharmacopœia," as it is more stable, less irritative, and nearly, if not quite, as accurate as the hypobromite reagent.

#### URIC ACID.

Uric acid has been found in the blood of gouty cases and of persons with pneumonia and nephritis, but the examinations in this line have been few, and only a proportion were performed upon blood taken from living persons. Inasmuch as uric acid is quickly altered by decomposition changes, and for this reason a large number of examinations of blood obtained post-mortem are worthless for purposes of inference, recently von Jaksch<sup>405</sup><sub>B. 11, H. 5, 8; Nov. 27, '90</sub><sup>8</sup> has published a number of examinations, taking this error into consideration. In all 105 specimens were examined: first, with the view of noting whether the collection of uric acid is in any way related to the acid intoxication in fever; and, second, to discover whether it is to be found in the blood in other conditions than gout. Of the 105, 9 were healthy persons, 11 cases of typhus fever, 11 of nervous affections; and the others were measles, angina, intermittent fever, hepatic disorders, diseases of the spleen, stomach, heart, lungs, and pleura,—tuberculosis, exudates, and emphysema; a few of acute articular rheumatism, renal affections, anæmia, and diabetes mellitus. He found uric acid in the blood of all cases in which anæmia or cyanosis was present; it was constant in 5 cases of pneumonia, but was negative in all the other febrile affections. It therefore could have nothing to do with causing the acid intoxication of fever. The occurrence in cyanosis shows that, in affections preventing the proper transition

of gases in the lungs, in the aëration of the blood rests one of the causes of uric acid. Von Jaksch extended his inquiry to transudates and to purulent collections, and found large amounts of uric acid in the former, but none, or but traces, in the latter. In 2 instances he found the highly toxic substance—guanin—in the pus examined: in 1 case obtained from a perinephritic abscess, in the other from a tubercular pleural collection.

Ebstein <sup>844</sup><sub>Sept. 26</sub> has recently conducted a series of examinations into the results announced from time to time by Pfeiffer. It will be recalled that the latter stated that, when urine is passed through a filter upon which uric acid is exposed to its solvent action, when the urine is normal, it adds uric acid to that upon the filter rather than takes from it. The urine of old persons, women, and children, for the most part, does not show this peculiarity, but that of healthy men does. So, too, in diseased states, the urine of persons affected with uric-acid calculi or with uratic arthritis deposits little or no uric acid on the filter, a circumstance regarded as of diagnostic value. Ebstein's experiments, however, show that a generalization from the cases of Pfeiffer to all cases of similar nature is not permissible. In 16 cases of gout or calculous disease, in 12 cases in which uric-acid diathesis was strongly suspected, this feature was not found at all regularly, either in amount or in the time of precipitation. In some cases, however, the phenomenon was well marked. From these results, it may be safely stated that Pfeiffer's test is not to be regarded as at all reliable. Haig, in continuation of his interesting examinations into the pathological physiology of the uric-acid diathesis, has contributed several papers bearing further upon the relations of this substance to high arterial tension and its consequences, <sup>2</sup><sub>Oct. 31</sub> and to diseases of the nervous system. <sup>15</sup><sub>Vol. xiv.</sub> These views have been so frequently mentioned in previous numbers of this publication that it may be regarded as pardonable to omit extended examination in the present edition. It is, perhaps, therefore, sufficient to recall that Haig believes that urea and uric-acid formation are constant in their relations to each other, but that their excretion, depending upon other factors, may vary. In relation to the excretion of uric acid, the relative alkalinity or acidity of the blood and tissues is of the greatest importance, great alkalinity rendering the uric acid in the system more completely dissolved, lowered alkalinity favoring its

precipitation and retention in the system. Where a period of lowered alkalinity, due to the use of flesh and acid diet, has intervened, large quantities of uric acid are retained, deposited in the liver, spleen, and points of slight and slow circulation generally; if, now, this period be succeeded by an "alkaline wave," induced by suddenly changing to a vegetable and alkaline diet or alkaline drugs, these quantities of uric acid are dissolved and swept throughout the system. The acid now acts upon the walls of the vessels and upon the various other tissues with which it comes into contact, particularly the nervous system, and is followed by constriction of the vessels, with consequent high tension and all its sequelæ, and with various phenomena of nervous character. Herringham<sup>2</sup><sub>Oct. 31</sub> has endeavored to corroborate Haig's researches upon this subject, but entirely without success. He attributes his failure to the fact that Haig has used in his estimations Haycraft's method for quantitative recognition of uric acid, while he separated and weighed it. Under these circumstances he cannot but believe that all of Haig's researches are unreliable and valueless.

Kahn<sup>222</sup><sub>Feb.</sub> reports a case of advanced gout, with great deposit of chalky tophi about the joints, especially of the hands, in a man but 30 years of age. The disease first manifested itself when the patient was 14 years of age. There was nothing in the family history to suggest a hereditary lithic-acid heredity. The writer suggests that in this condition lithium salts might be given in greater proportion by a method originated by the electrician, Edison,—an electrical endosmosis. Piperazin ( $C_4H_{10}N_2$ ), a new compound, manufactured by Schering, of Berlin, has been found to exercise a marked solvent action on uric acid, twelve times as much as lithium. Bardet<sup>34</sup><sub>June 16</sub> has recorded that, in an old gouty case, by daily injection of 0.3 gramme (5 minims) of hydrochlorate of piperazin he very materially lowered the uric-acid deposit in the urine; and his results are confirmed by Voigt and Ebstein and Sprague.<sup>4</sup><sub>No. 14</sub> Maldarescu<sup>259</sup><sub>June 1</sub> publishes a brief outline of diet proper for the use of lithæmic cases.

*Haycraft's Method of Estimation of Uric Acid.*—The above-mentioned question as to the reliability of Haycraft's uric-acid test, as well as several other objections and their discussion,<sup>2</sup><sub>Jan. 3, 10, 17</sub> have called forth from Haycraft a defense of his method.<sup>2</sup><sub>July 4</sub> In this defense he particularly contrasts his method with that of Salkowski,

and shows that the latter errs in his results, upon which he has based his statement of the unreliability of Haycraft's method. This mistake rectified, the results from Haycraft's and from Salkowski's methods stand very closely. The mistake depends upon the ratio of silver and uric acid, as tested by his own method, in which there is a correction of 14 milligrammes ( $\frac{4}{17}$  minim) made to each result. While this correction is perhaps true in urines containing a certain proportion of uric acid, in those containing a very small amount it becomes a very important figure, and very materially modifies the results. The lack of constancy complained of by Salkowski in Haycraft's method is one which is in regular gradation from those urines high in their proportion of uric acid to those whose quantum is low, and Haycraft is able very prettily to turn the complaint to Salkowski and his method, in that the latter recognizes a constant correction for an inconstant quantity.

#### URATES AND OTHER NITROGENOUS SUBSTANCES.

Sir William Roberts <sup>6</sup><sub>Nov. 29, '90</sub> suggests that, as gout may exist unattended by any uratic deposit, it would be well to separate this uratic deposit for clinical convenience and apply to it a definite term, and he proposes the word "uratosis" as a suitable name.

In urine where urates and uric acid are in large excess they not infrequently constitute a source of error in the examination of albumen and glucose, especially if these be in small amounts. These urates are very insoluble in cold, watery solutions, and Apéry <sup>232</sup><sub>Mar. 31</sub> bases upon this fact his proposition to cool the urine to about 4° or 5° C. (39.5° or 41° F.) before attempting the albumen or sugar tests. The cooling precipitates these urates, which in their deposit carry with them the mucus which may be present, and the supernatant liquid is in a favorable condition for the employment of the delicate reagents usually used.

Beugnies-Corbeau <sup>293</sup><sub>May</sub> mentions a reddish, roseate precipitate in several urines recently brought to his notice, due largely to urates which were colored with a substance probably identical with the urorosein of Nencki and Sieber. These urines were received from a case of uric-acid diathesis with hepatic cirrhosis and from a pneumonic patient with some hepatic complication. These rose-colored precipitates are not at all infrequent in the urine of persons recovering from severe or prolonged alcoholic debauches or from

febrile disturbances, and are usually composed of amorphous urates, with prominent coloring from the presence of some such substance as mentioned.

This same writer proposes, as a method for the estimation of the organic bodies in the urine, except urea,—the “extractive materials,” as he calls them,—a solution made up of bromine, 1 cubic centimetre (15 minims); of bromide of potassium, 10 grammes ( $2\frac{1}{2}$  drachms); and distilled water enough to make 100 cubic centimetres ( $3\frac{1}{2}$  ounces). This, placed into a glass-stoppered bottle, will keep indefinitely. The urine to be examined is freed from albumen, if it contains any; and then, into a tube of 1 centimetre in diameter and 35 centimetres in length, and marked off in cubic centimetres and tenth parts of the same, 7 cubic centimetres (108 minims) of the reagent and 21 cubic centimetres ( $5\frac{1}{2}$  drachms) of clear urine are placed, the tube closed, shaken, and permitted to remain in a vertical position for twenty-four hours. A flaky deposit occurs. Having taken a normal urine, he has found that each tenth of 1 cubic centimetre (15 minims) of deposit represents 0.0016 gramme ( $\frac{1}{40}$  minim) of these extractives (uric acid, hippuric acid, creatinin, xanthin, coloring matters, and extractives proper). The total amount may be computed according to this formula:  $E = 0.0016 Vn$ ; in which E represents the total amount; V the number of centimetres of urine employed, and n the number of tenths of a cubic centimetre of deposit.

*Urethan.* — Rademaker <sup>224</sup><sub>May</sub> reports that in albuminous urine he always finds a crystalline body differing from all the constituents of normal urine. It is isolated by evaporating several litres of albuminous urine to dryness on a water-bath, and extracting the residue with 98 per cent. alcohol. This is filtered, and evaporated at a low temperature. The oily residue is treated with dilute sulphuric acid and extracted with ether, the latter being permitted to evaporate spontaneously. Dissolve the residue in distilled water, and filter from the oily matter. Treat the filtrate with carbonate of potash to an alkaline reaction, and again extract with ether, the ether allowed to evaporate and the residue placed in an exsiccator over sulphuric acid, when gradually crystals, of the form of plates, separate. These crystals are dissolved in distilled water, and the solution treated with a solution of subacetate of lead, the excess of lead being removed with carbonate of soda, and again

extracted with ether. If, now, this ethereal solution is allowed to evaporate spontaneously it leaves *urethan* in a pure state. If a solution of these crystals are boiled with NaOH ammonia is evolved, showing the presence of nitrogen. If this alkaline solution is treated with an acid  $\text{CO}_2$  is evolved. Analysis of the substance proved the percentage quantity of C, H, and N to exactly correspond with that of urethan. A solution in distilled water treated with carbonate of soda and a few scales of iodine and then heated forms iodoform. Treated with a solution of ammonia, heated in a closed tube, neutralized with dilute sulphuric acid, and then distilled, these crystals give all the reactions for alcohol. These reactions and the ultimate analysis prove that this substance is identical with urethan. Urethan is a powerful narcotic, and Rademaker suggests that this substance is a factor in the uræmic poisoning in Bright's disease.

*Estimation of Phosphoric Acid.*—Bor<sup>230</sup><sub>May</sub> describes, without any addition or modification, the estimation of  $\text{P}_2\text{O}_5$ , by means of a standardized solution of uranium nitrate or acetate. Beugnies-Corbeau<sup>293</sup><sub>June</sub> reminds his readers that, in the ordinary heat test for albumen, a clouding, which dissolves upon the addition of a drop or two of acetic acid, is regarded as phosphatic. This, he says, is by no means always the case, as it may be globulin,—a substance giving many reactions similar to the phosphates. He states that the best way to positively differentiate between the two is by means of Esbach's solution (picric- and citric- acid solution), or by means of nitric acid, the globulin giving a precipitate, while the phosphates do not.

*Estimation of Chlorides.*—This same writer, in the same paper, describes the following method for escaping the difficulties in testing for chlorides in the urine by means of nitrate of silver in a standardized solution. These difficulties depend on the fact that, besides chlorides, a number of the substances which this author terms "extractives"—as uric acid and hippuric acid—are apt to act upon the silver salt and form combinations. He adds to 100 cubic centimetres ( $3\frac{1}{2}$  ounces) of clear, moderately colored urine 5 cubic centimetres (80 minims) of diplumbic acetate, or neutral acetate, in saturated solution. After permitting it to settle it is filtered, and of this 26 cubic centimetres (7 drachms)—corresponding to 25 cubic centimetres ( $6\frac{3}{4}$  drachms) of urine—

are mixed with an equal volume of a 1-to-100 solution of yellow chromate of potash. To the mixture a drop of acetic acid is added, and then the silver solution added from the burette. Each drop gives a red cloud, which disappears on shaking, as long as the precipitation of the chlorides is incomplete. As soon as it refuses to dissolve the amount of silver used is read off and the ordinary calculation made.

*Iodides in the Urine.* — Jolles<sup>880</sup><sub>B.30,p.288</sub> uses, in estimating the iodides in the urine, the decomposition of these salts by chlorine. Ten cubic centimetres ( $2\frac{1}{2}$  drachms) of urine are taken, and an equal quantity of hydrochloric acid and 2 or 3 drops of chlorine-water added. A brown color appears, which is changed to blue by the addition of starch-water. For quantitative estimation the urine is evaporated and charred and the char burned off. The residue is taken up with water acidulated with nitric acid, and nitrate of silver added to excess. The precipitate consists of the chloride and iodide of silver. It is collected, dried, and weighed, and then subjected to chloridization, as above. The difference in weight, due to the transformation of the iodide into the chloride, is the basis for calculation of the quantity of iodine in the primary precipitate.

Gillet<sup>62</sup><sub>Ost.</sub> calls attention to a source of failure in recognizing the presence of iodine in an ammoniacal urine, which must be of considerable importance. When one adds strong, fuming nitric acid to the urine containing an iodide the iodine is freed, and is usually recognized by solution with a purplish color in chloroform. If, however, the urine contains ammoniacal compounds this reaction may be quite different. The iodine reacts upon the ammonia salts, and is formed into nitric iodide and hydriodic acid ( $\text{NH}_3 + 6\text{I} = \text{NI}_3 + 3\text{HI}$ ). This substance is very unstable, and in decomposing forms iodic acid, hydriodic acid, and nitrogen ( $4\text{NI}_3 + 3\text{H}_2\text{O} = 6\text{HI} + 3\text{I}_2\text{O} + 4\text{N}$ ). Thus, one may entirely fail to get the characteristic chloroform solution. He suggests that to such a urine caustic potash be added to replace the ammonia, in order that this mistake be avoided.

#### TOXICITY OF THE URINE, BACTERIA, ETC.

The discovery of ptomaines and leucomaines in the urine has, within recent years, increased the importance to clinical

medicine of the chemical composition of this excretion, but the methods necessary for the estimation of these substances are far too complicated to even be of much service to the clinician. A rapid and simple method of measuring the toxic power is, therefore, very desirable, and, while open to a number of minor objections, the method proposed by Bouchard realizes, to a great degree, the requisites of such a procedure. This method consists simply of injecting the urine into animals subcutaneously, noting the amount required to kill, according to the body-weight of the animal. Semmola<sup>57</sup><sub>Oct.4;</sub> <sup>3</sup><sub>Aug.5;</sub> <sup>6</sup><sub>Sept.12</sub> cites several cases in which he has used this method with marked advantage. One was an old person with a severe phlegmon, in whom the general symptoms were very grave, but the biological results, indicating a gradual decrease in the toxic power of the urine, led him to give a favorable prognosis,—a prognosis borne out by the favorable termination of the disease. Another was a case of pneumonia, arising from a probably infectious origin. At one period a complication from cerebrospinal meningitis was feared, but the biological results with the urine indicated a favorable prognosis, which was also realized. In studying the toxic principles of the urine, Charrin<sup>927</sup><sub>Dec.13,'90;</sub> <sup>126</sup><sub>Oct.</sub> decides that at least three-quarters of the toxicity is due to those substances which are precipitable by alcohol and non-dialysable. Héricourt<sup>927</sup><sub>Dec.13,'90;</sub> <sup>126</sup><sub>Oct.</sub> has determined that whatever toxic principles exist in the blood are also largely of the same character. Mairet and Bosc<sup>3</sup><sub>Sept.23</sub> state that the average amount of urine of the entire twenty-four hours required to poison a rabbit is about 67 cubic centimetres ( $3\frac{3}{4}$  drachms) for each kilogramme ( $2\frac{1}{2}$  pounds) of weight of the animal. The symptoms appearing as poisoning advances are: myosis, abundant and clear micturitions, thirst, sometimes diarrhœa, respiratory changes, acceleration of the circulation, fever, and nervous symptoms,—as somnolence, coma, or apoplexy. Urine of the night is more toxic, more convulsive in its effects, and produces a more marked depression. Evening urine gives rise to a more clear somnolence. Kerry and Köbler<sup>8</sup><sub>No.29</sub> point out that in the urine of toxic cases (cases of infectious diseases) there is found a substance by which is precipitated benzoyl-chloride and sodium hydroxide. This precipitate is soluble in absolute alcohol, and when diluted with excess of water forms a thick, yellow, clouded solution, from which a crystalline precipitate falls out. This occurs especially in

the urines of cases of typhus, pneumonia, tuberculosis, diphtheria, and pyæmia; it does not form from the urine of healthy individuals. The non-dialysable extractives (those precipitated by alcohol) are studied by Eliacheff, who regards them as substances intermediate to the toxalbumens and the ptomaines, probably products of imperfect decomposition of the albumens or cellular products. Rovighi<sup>17</sup><sub>Oct. 16</sub> has devoted considerable labor recently to the study of the sulpho-ethers in the urine as an index of intestinal putrefaction. Their elimination varies greatly at different times during the day, and therefore the entire quantity of urine should be employed in the study of a case. Children show a less proportion of these substances, as a rule, than adults. The groups of terpinen and camphors, especially the essential oils of turpentine, lower the proportion of these substances in the urine in dogs, but are not as effective in man. Washing the intestines with tannic-acid solutions, boric-acid solutions, Carlsbad and Marienbad waters, or the use of kefir (the lactic acid in this last being the active agent) are suggested to prevent the intestinal putrefactive changes and the consequent excretion of the sulpho-ethers in the urine. The toxic properties of tubercular urine are said to be increased, by Crisafulli,<sup>589</sup><sub>No. 5</sub> upon the administration of Koch's lymph. In experimenting with the urine upon dogs, it was noted that the production of nervous symptoms, particularly of a tetaniform nature, was a prominent phenomenon. Cantu<sup>589</sup><sub>Mar. 2</sub> states that after injection of a patient with Koch's lymph the urine is increased in quantity, its specific gravity at first lowered and then increased, the urea diminished, as a rule, in relation to the amount of urine passed. In some cases albuminuria was induced. It is supposed that the diuretic effects of the lymph are due to the irritant influences upon the renal structure.

*Effect of Normal Urine on the Tissues.*—As to the effect of normal urine upon the tissues, Tuffier<sup>126</sup><sub>Oct.</sub> has determined that if it be aseptic it causes no deleterious change whatever; and, indeed, he finds that wounds of the mucous membrane of the bladder heal even better in the lower part of that viscus than in the upper, providing external factors are avoided. It seems possible, even, that fresh urine has antiseptic powers. Richter<sup>13</sup><sub>June; Sept.</sub><sup>321</sup> concludes that fresh urine has a fatal effect on the bacillus of splenic fever, on the spirillum of cholera, and, in a less degree, on the bacillus of typhoid fever; this antiseptic and germicidal effect is probably

due to the acid phosphate of sodium present. The degree of antiseptic power varies with the concentration of the urine, and almost disappears when the urine is neutralized or boiled for an hour (converting the acid into the neutral phosphate). There are other antiseptic substances, too, present which may act if the urine is very concentrated, even in the absence of the acid phosphate; it is not known positively whether these are chlorides or concentrated neutral phosphates.

*Thermogenic Substance in the Urine.*—Binet <sup>197</sup> <sub>Oct. ; Aug. 5</sub> <sup>3</sup> has discovered in human urine a thermogenic substance (at least for guinea-pigs), which is held by the amorphous precipitates as soluble ferments are, and which may be dissolved in glycerin and thence re-precipitated by alcohol. It is found particularly in the urine of tuberculous cases, but also in the urine of persons having other affections, as well as in normal urine, but in a much lower degree. Tubercular guinea-pigs are especially sensitive to its influence, although one may see a similar reaction in healthy animals, especially in the young and in pregnant females; but its action is much less constant and usually less intense than in the tubercular. Subcutaneous injections of this substance causes an elevation of from 1° to 2° C. (1.8° to 3.6° F.), the maximum being usually reached about the third hour after the injection. The febrile stage lasts about five hours, beginning about the second hour after injection, but it may be late or early, and prolonged or short. The reports made by Dixon, in this country, before the Academy of Natural Sciences at Philadelphia, upon the action of creatinin, suggests the query whether this is not identical to Binet's substance, especially as it corresponds closely in its actions to the soluble ferment.

*Bacteria in Urine.*—Finlayson <sup>2</sup> <sub>June 27</sub> mentions 2 cases of urine containing sarcinæ. The first was that of a man aged 57 years; the urine was turbid, containing neither albumen or sugar, but microscopical examination showed numerous sarcinæ and a few triple phosphates. Fifteen years later the sarcinæ were still to be found in his urine. When a boy he had had some urinary irritative symptoms, and had been sounded for vesical calculus; and it is possible that this may have been the origin of the infection. The second case was in a woman, the entrance of the micro-organisms having probably occurred upon catheterization after a con-

finement. These micro-organisms are practically harmless. Middleton<sup>2</sup><sub>July 4</sub> contributes a third case, occurring in a physician of 45 years of age, without further symptoms than a urinary turbidity. The cause was unknown, catheterization having never been performed upon him. He had had some spinal lesion from the effects of an accident which happened some years before, and eventually died from bulbar paralysis, but without ever evincing further urinary symptoms.

Ross<sup>285</sup><sub>Nov., '90</sub> reports several cases of urine,—non-purulent, but somewhat clouded, acid, and full of small bacilli. He regards the condition in his cases similar to that described by Roberts as non-septic bacilluria. The use of antiseptic agents, such as sodium salicylate, served readily to establish recovery.

*Pneumaturia*.—Mueller<sup>212</sup><sub>July 10</sub> reports 1 of these cases in an old man who, since 1884, has been passing bubbles of gas in his urine. This gas was inodorous, contained no  $H_2S$ , and for this, as well as other reasons, could not have entered the urinary tract from the intestine; it burned, giving a yellowish flame, and contained carbon binoxide, oxygen, hydrogen, and nitrogen. The gas was probably the result of fermentative changes in the urine itself, which contained a small amount of sugar, and was probably dependent upon the presence of bacteria.

*Ferment Substances in the Urine*.—Grüntzner,<sup>69</sup><sub>Jan. 1</sub> in a paper reviewing the knowledge upon this subject, speaks of the presence in the urine of a diastasic ferment of pepsin, chymosin, and trypsin. These are present, probably, as the result of their generalization and elimination; they ordinarily are of no moment, but may act as various other animal products (as poisons). The first is particularly to be found in the urine of persons fasting and after meals; under pathological conditions, such as diabetes mellitus and diabetes insipidus, and in affections preventing its proper escape from the place of formation. Pepsin is found in considerable quantities in the urine after fasting, in the morning's urine in very small amount, in conditions affecting its proper formation and secretion (as cancer of the stomach), and in large amounts in diabetes mellitus. Chymosin is found in the urine commonly, but is not subject to as regular variations as the other ferments. Trypsin is found under very variable circumstances, and is without as much significance as either of the first two mentioned.

*Separation of Sediments, etc.*—Litten<sup>69</sup><sub>No. 23; Nov.</sub><sup>26</sup> describes a whirling apparatus, similar to the recently-proposed hæmokrit, for the throwing of precipitates and sediments. The urine, or other fluid from which it is desired to have the sediment separated, is placed in a tube attached to a whirling disc. Rapid whirling causes the centrifugal force to be used upon the particles contained in it, and they are thrown rapidly to the far end of the tube. In about three minutes he is able to throw out the sediment for microscopical examination.

Finally, mention may be made of a number of articles devoted to the general consideration of urinary examination, in which are described the principal methods of estimation of the prominent substances, normal and pathological, in the urine. Among them are papers by Long,<sup>43</sup><sub>Aug.</sub> Wysong,<sup>2012</sup><sub>Apr. 28 to May 1</sub> and Preble.<sup>222</sup><sub>Apr.</sub>

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Hypodermic "Tablets,"—

(continued.)

drochlorate, unirritating), 1/250 gr. Hydrarg. Perchlor., 1/60 and 1/30 gr. Hyoscine (Hydrochlorate), 1/200 and 1/75 gr. Hyoscyamin (Sulphate), 1/80 and 1/20 gr.

Morphine Bi-Meconate,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$  gr. Morphine Hydrochlor.,  $\frac{1}{4}$  gr. Morphine Sulphate, 1/12, 1/8, 1/6, 1/4, 1/3, and 1/2 gr. Morphine and Atrophine Combinations.

Pilocarpin (Hydrochlorate), 1/10, 1/3 and 1/2 gr. Quinine Hydrobromate, 1/2 gr. Sclerotic Acid, 1/2 and 1 gr. Sparteine Sulphate, 1/2 gr. Strophanthin, 1/500 gr. Strychnine Sulphate, 1/50, 1/100, 1/60 gr.

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"Tablets" of Compressed Drugs prepared by Burroughs, Wellcome & Co.—

Aconite Tinct., 100 in bottle.

Aloin, 1/10 gr 100 in bot. Ammon. Bromide, 5 grs, 100 in bottle; 10

"Tabloids"—continued.

grs, 100 in bottle. Ammon. Chloride, 3 grs, 30 and 100 in bottle; 5 grs, 100 in bottle; 10 grs, 100 in bottle. Ammon. Chlor. with Borax, 100 in bottle. Antacid Calcium Carb. Præcip, 3 1/2 gr; Magnes. Carb. 2 1/2 gr; Sodium Chloride 1 gr, 25 and 100 in bot. Anti-Constipation (Aloin, 1/5 gr; Belladonna Ex., 1/8 gr; Strych., 1/60 gr; Ipecac., 1/16 gr), 50 in bottle. Antifebrin, 2 gr. 25 and 100 in bottle. Antim. Tartrate, 1/50 gr, 100 in bottle. Antiprin, 5 gr, 25 and 100 in bottle. Apomorphine Mur., 1/50 gr, 50 in bottle. Arsenious Acid, 1/100 and 1/50 gr, 100 in bottle. Atropin Sulph., 1/100 gr, 50 in bottle. Belladonna Tinc., 1 min, 100 in bottle. Bismuth Sub-nit. 5 gr, 25 and 100 in bottle; 10 gr, 100 in bottle. Blue Pill, 3 gr, 25 and 100 in bottle. Borax, 5 gr, Calcium Sulph., 1/10 gr, 100 in bottle. Caffeine Citrate, 2 gr, 100 in bottle. Calomel, 1/2 and 1 gr, 100 in bottle. Capsicum Tinct, 1 min, 100 in bottle Cascara Sagrada Ext., 2 gr, 25 and 100 in bottle. Cascara Compound (Cascara Dry Ext., 1 gr, Euonymin, 1/2 gr; Hyoscyamus Dry Ext., 1/3 gr; Nux Vomica Ext., 1/16 gr), 24 and 100 in bottle. Cathartic Comp., U.S.P. Ext. Coloc. Co. Pulv, 1 1/3 gr; Ext. Jalapæ Pulv., 1 gr; Hyd. Subchlor, 1 gr, Cambogiæ Pulv., 1/4 gr, 24 and 100 in bottle. Charcoal 5 gr, in oval bottles containing 25 and 100. Chloral Hydrate, 5 gr, 100 in bottle. Chloral-Amid 5 gr, 100 in bottle. Cocain, 1 gr; Cocain, with Potash and Borax (*see* Voice.) Cretæ Aromatic, c Opio. Pulv., 5gr., in bottles of 25 and 100. Digitalis Tinct., 1 min, 100 in bottle. Digitalin, 1/100 gr, 50 in bottle. Diuretin (Knoll), 5 gr, 25 and 100 in bottle; Dorer's Powder (*see* Ipecac. Opio.) Euonymin Resin, 1/8 gr, 50 in bottle; Exalgin, 2 gr, 100 in bottle. Ferrum redactum (*see* Reduced Iron); Gregory's Powder (*see* Rhubarb Comp. Pulv.) Hydrarg. Cretâ, 1/3 gr, 100 in bottle. Hydrarg. Iod Rubr., 1/20 gr, 50 in bottle; Hydrarg. Iod. Vir. 1/8 gr, in bottle. Hydrarg. Perchlor. 1/100 gr, 100 in bottle. Hydrastia Comp. (Hydrastia Mur., 1/4 gr; Ergotin, 1/2 gr; Cannabin Tannate, 1/2 gr), each tabloid, 100 in bottle. Ipecac. and Opium (Dover's Powder), 5 gr, 24 and 100 in bottle; 1/4 gr, 100 in bottle. Ipecac. Powder, 5 gr, 100 in bottle; 1/10 gr, 100 in bottle. Iron and Arsenic Comp.

"Tabloids"—continued.

(Quinine Bisulph., 1 gr; Iron Hypophosp., 2 gr; Arsenic, Strychnine Sulph. ââ, 1/50 gr), 100 in bottle. Iron and Quinine Cit., 3 gr, 25 and 100 in bottle. Laxative Vegetable, 25 and 100 in bottle; Lithia Carbonate, 2 gr, 100 in bottle. Manganese Dioxide, 2 gr, 25 and 100; Morphia Sulph. 1/20 and 1/8 gr, 50 in bottle each. Nitroglycerine, 25 in bottle (*see* also Trinitrine). Nux Vomica Tr., 1 min, 100 in bottle. Opium Tinct, 2 mins, 50 in bottle; Pancreatin (*see* Zymine "Tabloids." Papain (Finkler), 2 gr, 25 and 100 in bottle. Pepsin Tabloids (Fairchild), 25 and 100 in bottle. Pepsin saccharated, 5 gr, 100 in bottle. Peptonic 3 gr, 25 and 100 in bottle. Phenacetin, 5 gr, 25 and 100 in bottle. Pilocarpin Mur, 1/20 gr, 50 in bottle. Podophyllin Resin, 1/4 gr, 100 in bottle. Potash Bicarb, 5 gr, 40 and 100 in bottle. Potass. Bromide 5 and 10 gr, 100 in bottle. Potash Chlorate, 5 gr, 40 and 100 in box Vinaigrette style. Potash Chlor. with Borax, 40 and 100 in box, Vinaigrette style, 40 and 100 in bottle. Potass. Iodide, 5 gr, 100 in bottle. Potash Nit. (*Sal Prun.*), 5 gr, 100 in bottle. Potass. Permanganate, 1 gr, 100 in bottle; 2 gr, 100 in bottle. Quinine Bisulphate, 1/2 gr, 50 and 100 in bottle 1 gr, 36 and 100 in bottle; 2 gr, 24 and 100 in bottle; 3 gr, 24 and 100 in bottle; 5 gr, 24 and 100 in bottle. Reduced Iron, 2 gr, 100 in bottle. Rhubarb Comp. (Pill) 3 gr (Rhei. Pulv. 1 1/4 gr, Aloes, Soc. Pulv. 1 gr, Saponis, Pulv. 5/8 gr. Myrrhæ, Pulv., 5/8 gr. Ol Menth, Pip.). 24 and 100 in bottle Rhubarb Comp. Pulv, 5 gr (Gregory Powder) 24 and 100 in bottle Rhubarb and Soda, 5 gr (Rhei. 3 grs, Soda, 2 gr, Zingiber, 1/2 gr), 24 and 100 in bottle. Rhubarb, 3 gr, 24 and 100 in bottle. Saccharin, 1/2 gr, 100 and 200 in oval bottle. Salicin, 5 gr, 25 and 100 in bottle Salol, 5 gr, 25 and 100 in bottle Santonin, 1/2 gr, 50 in bottle. Soda Bicarbonate, 5 gr, 40 and 100 in bottle. Soda-Mint or Neutralising Tabloids (Soda Bicarb., 4 gr, Ammon. Carb. 1/4 gr, Ol Menth. Pip. 1/4 gr), 30 and 100 in bottle. Soda Salicylate, 3 gr, 100 in bottle. Strophanthus (2 mins. of tincture in each) 50 and 100 in bottle. Sulphonal, 5 gr, 25 and 100 in bottle. Sulph. Comp., Sir A. Garrod's formula (Sulph. Præcip., 5 grs, Potass. Bitart., 1 gr), 25 and 100 in bottle. Test "Tabloids" for preparing Fehling's Solution.

"Tabloids"—continued.

Tannin, 2 1/2 gr, 100 in bott. Thirst 25 and 100 in bott. Tonic Comp. (Iron Pyrophos., 2 gr, Quinine, 1 gr, Strychnine 1/100 gr), 25 and 100 in bottle. Trinitrine (Nitroglycerine), 1/100 gr, 25 and 100 in bottle, 7d and 1s 6d each; 1/50 gr, 25 and 100 in bottle, 7d and 1/6 each. Trinitrine and Amyl Nitrite, 25 and 100 in bottle, 1s. and 3s. each. Trinitrine Comp. (Trinitrine, 1/100 gr, Nitrite Amyl, 1/2 gr, Capsicum, 1/50 gr, Menthol, 1/50 gr), 25 and 100 in bottle. Urethane, 5 gr, 25 and 100 in bottles. Voice (Potash, Borax and Cocain), 30 and 80 in boxes, in oval bottles. of 30 each. Warburg's Tincture (30 mins. each) 100 in bottle. Zinci. Sulph., 1 gr, 100 in bottle; Zinci. Sulpho. Carbolate, 2 gr, 100 in bottle. Zymine (Fairchild), 25 and 100 in bottle. Zymine Compound (Fairchild)—Zymine, 2 gr; Bismuth Sub-nit, 3 gr; Pulv. Ipecac., 1/10 gr in each "Tabloid," 25 and 100 in bottle.

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